DOCUMENT RESUME

ED 149 579 EC 104 173

AUTHOR	Dudek, R. A.; And Others
TITLE	Human Rehabilitation Techniques. Work-Session Reports. Volume V.
INSTITUTION	Texas Tech Univ., Lubbock.
SPONS AGENCY	National Science Foundation, Washington, D.C. Office of Exploratory Research and Problem Assessment.
PUB DATE	77
GRANT	ERP-75-10594; ERP-75-10594-A01
NOTE	165p.; A Technology Assessment; For related information, see EC 104 163-174
EDRS PRICE	MF-$0.83 HC-$8.69 Plus Postage.
DESCRIPTORS	Conference Reports; Delivery Systems; *Handicapped; Physical Therapy; *Policy Formation; Preschool Education; *Rehabilitation; *Technology; Transportation; Vocational Education; Work Environment

ABSTRACT

Volume V of a six-volume final report (which covers the findings of a research project on policy and technology related to rehabilitation of disabled individuals) presents consensus findings of multidisciplinary experts who have dealt with specific areas of rehabilitation technology. Following a chapter on the basic concepts of the work-session conference are chapters which cover environmental change in the workplace and in the transportation system, the physical therapeutic agent and rehabilitation devices, preschool academic education and vocational education, and service delivery. Described for each of the program thrusts listed above are the following: description of target population; strategies for achieving program thrust, assumptions and axioms; objectives and performance requirements; implementation requirements; life--function analysis; affected individuals, groups, and organizations; group-discussion consequences; hierarchical and interrelationship analysis; and policy considerations. A final chapter reviews the procedures used for work-session evaluations and presents a sample evaluation questionnaire. (SBH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED149579

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

HUMAN REHABILITATION TECHNIQUES

A TECHNOLOGY ASSESSMENT

Department of Industrial Engineering
R. A. Dudek
M. M. Ayoub
R. F. Powers

Research and Training Center in Mental Retardation
C. K. Sigelman
A. S. Martin
G. J. Bensberg

Department of Systems
J. R. Burns
W. M. Marcy

Technical and Professional Writing Program
C. W. Brewer
C. E. Lyle

TEXAS TECH UNIVERSITY

Volume V

Supplemental Report:
Work-Session Reports

EC104173

FOREWORD

This document is the fifth volume of the final report *Technology Assessment: Human Rehabilitation Techniques*, a project conducted at Texas Tech University by the Department of Industrial Engineering, the Research and Training Center in Mental Retardation, the Department of Systems, and the Technical and Professional Writing Program. The research has been conducted with the support of National Science Foundation grants ERP 75-10594 and ERP 75-10594 A01, monitored by the Directorate for Research Applications, Division of Exploratory Research and Systems Analysis.

Richard A. Dudek, Horn Professor and Chairman of the Department of Industrial Engineering has been a co-principal investigator and director of the project. Gerard J. Bensberg, Director of the Research and Training Center in Mental Retardation, and M. M. Ayoub, Professor of Industrial Engineering, have been co-principal investigators. Carol M. Sigelman and Andrew S. Martin of the Research and Training Center in Mental Retardation and Robert F. Powers of the Department of Industrial Engineering have been program managers for the project. James R. Burns and William M. Marcy of the Department of Systems have been in charge of the modeling used in the project. Technical writing has been performed by Charles W. Brewer and Cynthia E. Lyle of the Technical and Professional Writing Program. In addition, several research assistants and support personnel, as listed in the individual volumes of the study, have contributed to the project.

The project team wishes to acknowledge the efforts of individuals who have served on the Oversight Committee, Elizabeth Boggs, Kan Chen, Beatrix Cobb, Ronald Conley, Richard Herman, John Noble, Jr., Evan Vlachos, and Lester Wolcott; of Lee Phillips who served effectively as a program manager for a short time before leaving Texas Tech; of Brian Lambert who served as Work Session Conference Coordinator; of those who participated in the work-sessions chaired by Ted Hartman, David Malone, Blair Rowley, Evan Vlachos and John Wittman; and of Anne Seitz, the Secretary of the Project.

Although the National Science Foundation has supported this project, the findings, conclusions and recommendations expressed are those of the research team and do not necessarily reflect the views of NSF.

TABLE OF CONTENTS

THE WORK SESSION CONFERENCE — Chapter 1

Basic Concepts of the Work-Session Conference 1-2

Computer-Generated Consequences. 1-5

The Role of the Work-Session Conference in the Technology-Assessment Project 1-6

Development of Work-Session Conference Methodology. 1-8

Logistics of the Work-Session Conference 1-18

Evaluation of Work-Session Conference. 1-26

ENVIRONMENTAL CHANGE WORK-SESSION PANEL — Chapter 2

Program Thrust 1: Environmental Change in the Workplace. 2-1

Description of Target Population 2-1

Strategies for Achieving Program Thrust. 2-3

Assumptions and Axioms 2-3

Objectives and Performance Requirements. 2-4

Implementation Requirements. 2-5

Life-Function Analysis 2-6

Affected Individuals, Groups, and Organizations. 2-7

Group-Discussion Consequences. 2-8

Hierarchical and Interrelationship Analysis. . . . 2-10

Computer-Generated Consequences. 2-11

Policy Considerations. 2-11

Program Thrust II: Environmental Change in the Transportation System 2-16

Description of Target Population 2-17

Strageties for Achieving Program Thrusts 2-17

Assumptions and Axioms 2-17

Objectives and Performance Requirements. 2-18

Implementation Requirements. 2-19

Life-Function Analysis 2-20

Affected Individuals, Groups, and Organizations. 2-21

Group-Discussion Consequences. 2-23

Hierarchical and Interrelationship Analysis. . . . 2-25

Computer-Generated Consequences. 2-27

Policy Considerations. 2-31

PHYSICAL INTERVENTION WORK-SESSION PANEL Chapter 3

Program Thrust I: Physical Therapeutic Agent. . . . 3-1

Description of the Target Population 3-1

Strategies for Achieving Program Thrusts 3-3

Assumptions and Axioms 3-3

Objectives and Performance Requirements. 3-4

Implementation Requirements. 3-4

Life-Function Analysis 3-7

Affected Individuals, Groups, and Organizations. 3-8

Group-Discussion Consequences. 3-11

Hierarchical and Interrelationship Analysis. . . . 3-14

Computer-Generated Consequences. 3-15

Policy Considerations. 3-15

Program Thrust II: Rehabilitation Devices 3-19

Description of the Target Population 3-19

Strategies for Achieving Program Thrusts 3-19

Assumptions and Axioms 3-20

Objectives and Performance Requirements. 3-20

Implementation Requirements. 3-21

Life-Function Analysis 3-22

Affected Individuals, Groups, and Organizations. 3-24

Group-Discussion Consequences. 3-26

Hierarchical and Interrelationship Analysis. . . . 3-27

Policy Considerations. 3-27

TRAINING AND COUNSELING WORK-SESSION PANEL Chapter 4

Program Thrust I: Preschool Academic Education. 4-1

Description of Target Population 4-1

Strategies for Achieving Program Thrust. 4-3

Assumptions and Axioms 4-3

Objectives and Performance Requirements. 4-4

Implementation Requirements. 4-4

Life-Function Analysis 4-5

Affected Individuals, Groups, and Organizations. 4-6

Group-Discussion Consequences. 4-7
Hierarchical and Interrelationship Analysis. . . . 4-9
Computer-Generated Consequences. 4-9
Policy Considerations. 4-14
Program Thrust II: Vocational Education 4-14
Description of Target Population 4-15
Strategies for Achieving Program Thrusts 4-15
Assumptions and Axioms 4-16
Objectives and Performance Requirements. 4-17
Implementation Requirements. 4-17
Life-Function Analysis 4-19
Affected Individuals, Groups, and Organizations. 4-20
Group-Discussion Consequences. 4-21
Hierarchical and Interrelationship Analysis. . . . 4-21
Policy Considerations. 4-23

SERVICE DELIVERY WORK-SESSION PANEL Chapter 5

Program Thrust 5-3
Description of Target Population 5-5
Strategies for Achieving Program Thrust. 5-5
Assumptions and Axioms 5-6
Objectives and Performance Requirements. 5-8
Implementation Requirements. 5-9
Life-Function Analysis 5-10
Affected Individuals, Groups, and Organizations. 5-11

Group-Discussion Consequences. 5-15

Hierarchical and Interrelationship Analysis. . . . 5-16

Computer Generated Consequences. 5-21

Policy Considerations. 5-24

WORK-SESSION EVALUATIONS Chapter 6

Questionnaire Design 6-1

Questions and Responses. 6-2

Analysis of Responses. 6-2

CHAPTER 1
THE WORK-SESSION CONFERENCE

During the early stages of the Technology Assessment of Human Rehabilitation Techniques, an information base was compiled to provide data about disability, rehabilitation technology, and broad characteristics of American society. Fourteen representative disabilities provided "case study" information which was analyzed and then put into a form detailing life-function needs of disabled persons. Literature and other sources of information about the same 14 disabilities provided information about the technologies which are currently used in attempts at satisfying life-function needs and requirements. A parallel study was undertaken to provide information about the context surrounding rehabilitation and the broader characteristics of American society.

Later stages of the study consisted of analysis of the information base in conjunction with the best-obtainable judgments about the meaning of rehabilitation technology in relation to the future of American society. In these stages of the project, judgments of knowledgeable persons throughout a wide range of disciplines were sought and compiled. Consequences of events in rehabilitation both upon the disabled and upon broader society were proposed and explored by

interdisciplinary methods; consequences of broader societal events upon rehabilitation and the disabled were also examined. This examination was designed to elicit a picture of characteristics associated with rehabilitation technology, of particular consequences related to rehabilitation, and of policymaking considerations which logically stemmed from the consequences.

The initial step in determining characteristics associated with rehabilitation, consequences, and policymaking consisted of holding a carefully planned conference among persons particularly knowledgeable about and skilled in judgments about rehabilitation and its various contexts. The conference was the vehicle which provided many of the initial judgments which enter into the conclusions of this technology assessment.

BASIC CONCEPTS OF THE WORK-SESSION CONFERENCE

Within conventions developed for technology assessment, there are many methods for accomplishing interdisciplinary study of consequences. These methods range from surveys of knowledgeable persons in various disciplines to elaborate "Delphi" techniques involving controlled review and reexamination of concepts by multidisciplinary teams of experts. The particular methods chosen for the consequence analysis of human rehabilitation techniques made use of work-session conferences. The work-session conference method was selected

because of widely varying fields within disability, rehabilitation, and American social and economic studies. Although survey and Delphi techniques are practical for deriving consequences surrounding more homogeneous groups of technologies and applications, neither method could provide the number of useful judgments about rehabilitation which the work-session conference method could within the time and resource limitations of this assessment. Only the work-session conference method could provide the interdisciplinary mixing of the widely varied judgments and expertise necessary to the project.

In the work-session conference, the key operating concept involved interaction of knowledgeable persons making full use of the project information base. Participating persons were provided with project research information about disability, life-function needs, rehabilitation technology, current and future societal characteristics, and other assessment variables well in advance of the conference. Participants were charged with analyzing the information base from the perspectives of their individually maintained areas of knowledge, expertise, and experience in preparation for discussion of the information with conference peers. Areas of knowledge, expertise, and experience among participants were widely varied. Persons attending included physicians, physical therapists, rehabilitators, engineers, ergonomists, economists, sociologists, psychologists, architects, information-system specialists,

government administrators, and persons with various disabilities.

The conference was organized for the most varied communication possible among individuals, small groups, and the large group comprising all participants in the conference. Forty persons attended the conference. Each person was assigned to a work-session panel of 10 members according to his areas of knowledge, expertise, experience, and interest. Each work-session panel was charged with examining consequences and policymaking implications within one of the four broad areas of program thrusts (*viz.* categories of rehabilitation and rehabilitation-related technologies). Although most of each person's time at the conference was spent within small work-session panel meetings adhering to a rigorous program for deriving consequences and projecting policymaking implications, conference procedures ensured that individual members also had the opportunity to confer with other individuals on their own panels and within the conference as a whole. Meetings attended by members of all panels and group presentations ensured that experiences and knowledge gained by one panel were shared with other panels.

One member in each work-session panel was assigned the task of formalizing a group-generated structural model for each program thrust considered by that panel. This structural model formed the basis for computer-supported analysis of major rehabilitation-oriented variables. The

models consisted of graphically constructed and quantifiable pictures of the interactions both internal to and external to the "rehabilitation system."

COMPUTER-GENERATED CONSEQUENCES

Work-session panelists were asked to evaluate the strengths of couplings among variables involved in each program thrust. Magnitudes were then assigned to the couplings according to the following relative magnitude scale.

1. Magnitudes in the range 0.0 to 0.1 imply a weak coupling.
2. Magnitudes in the range 0.1 to 1.0 imply moderate coupling.
3. Magnitudes in the range greater than 1.0 imply strong coupling.

Whenever possible, the magnitudes were further refined. In addition, work-session panelists were asked to assign a value, a scale of 0 to 1, to the variable in 1950. This procedure provided a set of initial values. In every case, the value 1.0 is assumed to be the point at which outside forces come into play to limit the growth of a variable. Data obtained during the work session is recorded in the form of a cross-impact matrix suitable for use by a computer-simulation model. An entry in a row of the matrix represents a causal link having both a sign and a magnitude, between particular variables. Plus (+) and minus (-) signs indicate that variables increase or diminish the affected variables.

All causal links in the model are assumed to be present from the beginning (year 1950) through the end of the simulation (Year 2025).

THE ROLE OF THE WORK-SESSION CONFERENCE IN THE TECHNOLOGY-ASSESSMENT PROJECT

In essence, the conference was a vehicle for merging information previously gathered by project team members with information from the knowledge, areas of expertise, and experiences of conference participants. Additionally, the conference provided the initial milestone in project development of consequences and policymaking considerations: judgments of participants and team members formulated initial project results.

Figure 1-1 shows the information-flow used in work-session group analysis.

In considering each program thrust, each work-session group drew on (1) life-function and disability information, (2) rehabilitation technology information, and (3) state-of-society information available from project working papers. State-of-society information included both a set of scenarios descriptive of the characteristics of American society from 1950 through 2025 and a set of unquantifiable "related issues" encompassing the attitudinal, social, and "political" variables involved in disability, rehabilitation, and society as a whole.

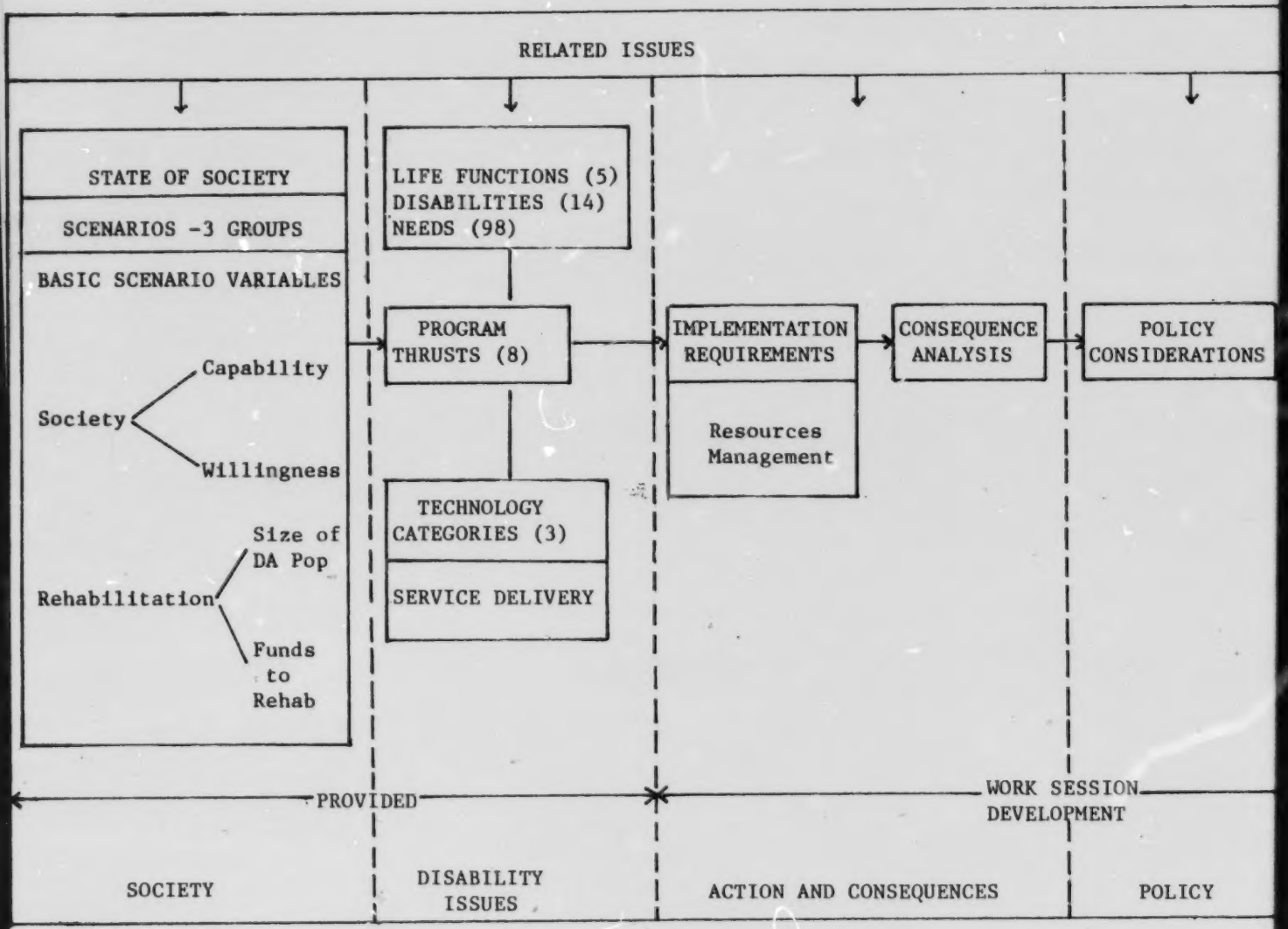


Figure 1-1. General methodological structure consequence analysis work session

All three sources of information were integrated through work-session discussion to produce concrete descriptions of the ways rehabilitation programs within the four areas of technology had been operating, were operating, and would or should operate within. Such factors as affected persons, groups, and organizations, resource requirements, and implementation requirements were analyzed, discussed, and described in order to provide a more thorough basis for consequence analysis. After deriving consequences likely from program implementation, work-session groups decided which consequences entered into public-policymaking decisions and formulated descriptions of specific policymaking considerations.

DEVELOPMENT OF WORK-SESSION CONFERENCE METHODOLOGY

The procedures used during the conference were developed to fulfill particular requirements of this technology assessment. A structural format for the exchange of information was used because of the extreme amount of interaction which was required among persons of widely varying expertise and experience. The structure of the conference into large- and small-group meetings was used for similar reasons. Individual work-session meetings were planned to correspond to the data-base model for the project so that maximum use could be made of the technology-oriented information being

gathered. Much of the concrete procedure used in arriving at consequences was tailored to the project-pervasive consideration of disability as life-function impairment.

Because the procedures used during the conference were unique to this project and previously untested, the project team validated them during an extended mini-assessment meeting. The three-day mini-assessment meeting, held early in the project more than a year prior to the work-session conference, was effectively a model of the tasks to be performed during the project and the projected conference. Figure 1-2 outlines the basic objectives established by the project team for the mini-assessment and figure 1-3 is an outline of events occurring at the mini-assessment meeting.

Upon commencement of the project, the team had spent several weeks in establishing a complete project plan and PERT Activity Network to aid in planning and scheduling of the total research effort. In the mini-assessment, each event was a scaled-down version of the activities in the PERT network, including research steps leading to the conference, events designed to take place in the work-session conference, and steps leading to the final report. For all activities except the trial work-sessions the scale-down time factor used for the activity during the mini-assessment was one minute equivalent to one week of project time. Thus, the events numbered 200-500 leading to the first oversight

June 18, 1975

TECHNOLOGY ASSESSMENT: Human Rehabilitation Techniques

MINI-ASSESSMENT PROGRAM

Objectives: Upon completion of the three day program,

(1) each participant will be able to conduct a technology assessment work session utilizing the conceptual model and methodology described in the proposal,

(2) test of several team assessment methodologies,

(3) definition of scenarios should be delineated,

(4) aid our development of a data base,

(5) determine material for first mailing to oversight (O/S) committee and outline of the committee's first meeting,

(6) a tentative outline of our final report should emerge,

(7) a check of our PERT activity schedule will have been accomplished, and

(8) potential cycling between activities on the PERT activity schedule should be apparent.

NOTE: The schedule included is intended to keep the program on time and provides ample space for you to jot down your comments and ideas that will be discussed during the recap/evaluation sessions.

Figure 1-2. Objectives of mini-assessment

Day 1

Activity No.	Responsibility	Activity Description	Estimated Time Schedule Start	Stop
0-200	Dudek	General orientation to the mini-technology assessment: objective of the project, general rules, handouts.	8:30	8:50
200-500	Bensberg	Plans for the first oversight committee meeting: outline of sub-tasks necessary in planning to include critical dates for mailings to O/S committee, accommodations, etc.	8:50	9:00
200-400	Phillips	Mini-TA work session: definitions of methodology, conceptual model, life functions, rehabilitation technologies, scenarios.	9:00	9:15
0-300 thru 800-1000	Martin	Definition of data base: 1/2 time in explanation of the general data base under development - incidence, prevalence, etc. Approx 1/2 time in explanation of the mental retardation data available for mini-assessment.	9:15	9:40
700-900	Dudek	Designate L.F. and R.T. participants: o[illegible]e of the expertise needed for L.F. and R.T. w[illegible] sessions.	9:40	9:50
600-900	Sigelman	Assignments for the L.F. work sessions: individual assigned roles for the L.F. work sessions.	9:50	9:55
500-600	Bensberg (Cobb, Ayoub, Ramsey)	First O/S committee meeting: role playing--evaluation of the proposed model, data base, etc.	9:55	10:10
Break			10:10	10:40

NOTE: Ample space was provided for comments after each activity.

Figure 1-3. Mini-assessment schedule: human rehabilitation techniques

Day 1 (Con't)

Activity No.	Responsibility	Activity Description	Estimated Time Schedule Start	Stop
800-1400	Brewer	Discussion of format for data base report: from the information presented plus prior planning, a brief presentation of how the data might be most effectively prepared.	10:40	10:50
800-3300	Phillips	Discussion of impact inventory matrix: how Kane's work might be applied to give decision makers some insight into possible consequences of utilizing promising technologies	10:50	11:00
1000-1100	Sigelman	Final limitation on scope of model to L.F. committee: based on comments from O/S, a refinement of model and data base may be necessary, additional mental retardation data presented.	11:00	1:00
Lunch				
1200-1300	Sigelman, Phillips	Mini - L.F. work session:* experiment with two groups, each using a different methodology, both utilizing the same life function (life functions, rehabilitation technology, scenario definitions and methodology will be provided)	1:00	2:00
Break			2:00	2:45
	Bensberg, Dudek	Two groups, using methodologies above or new ones, each covering the same life function but different from above.	2:45	3:45
Break			3:45	4:30

Figure 1-3 (continued). Mini-assessment schedule: human rehabilitation techniques

Day 1 (Con't)

Activity No.	Responsibility	Activity Description	Estimated Time Schedule Start	Stop
	Sigelman, Phillips, Bensberg, Dudek	Report of the four groups: emphasis on progress made, problems encountered	4:30	5:30
Break			5:30	6:00
	Phillips	General discussion of the methodologies: emphasis on deciding which methodology shows the most promise for this particular technology assessment.	6:00	7:00
Day 2				
	Brewer	Review of Day 1 activities: recording systems, evaluation assessment of activities--time wasted, etc. Agree on methodology showing most promise.	8:30	9:30
Break			9:30	10:00
	Ayoub, Ramsey	Mini-L.F. work session (con't): two groups, using one or possibly two methodologies, cover two life functions (one per group).	10:00	12:00
Lunch			12:00	1:30
1300-2100	Sigelman (Phillips, Bensberg, Dudek, Ayoub, Ramsey)	Recap of five L.F.'s with scenario descriptions.	1:30	2:10

Figure 3-1 (continued). Mini-assessment schedule: human rehabilitation techniques

Day 2 (Con't)

Activity No.	Responsibility	Activity Description	Estimated Time Schedule Start	Stop
1500-2100	Sigelman	Evaluation of life function scenarios.	2:10	2:40
Break			2:40	3:00
1900-2000	Martin	Definition of data base for R.T. work sessions: particulars of the data available to the work sessions.	3:00	3:25
900-1900	Martin	Individual assignments for the R.T. work sessions.	3:25	3:30
Break			3:30	4:00
2000-2700	Ayoub, Ramsey	Mini-R.T. work session: two groups using one to two methodologies covering human rehabilitation techniques.	4:00	5:00
		Evaluation of the first R.T. work sessions.	5:00	6:00
Day 3				
	Sigelman, Phillips	Mini-R.T. work sessions (con't): two groups using one methodology for different R.T.'s.	8:30	10:30
Break			10:30	11:00
	Martin	Recap of three R.T.'s with scenario descriptions.	11:00	12:00
Lunch			12:00	1:00

Figure 1-3 (continued). Mini-assessment schedule: human rehabilitation techniques

Day 3 (Con't)

Activity No.	Responsibility	Activity Description	Estimated Time Schedule Start	Stop
2700-3400	Bensberg (Cobb, Ayoub)	Second oversight committee meeting and sponsor review: role playing--evaluation of work performed in the work session.	1:00	3:00
Break			3:00	3:30
3300-3400	Brewer	Format for final report: try to outline the chapters of the final report based on activities of the past three days.	3:30	5:00

Figure 1-3 (continued). Mini-assessment schedule: human rehabilitation techniques

committee meeting were allotted 10 minutes for discussion for they were planned to be scheduled over a 10 week period. For all the activities except the final work-session, the team member responsible outlined the general approach for that activity--steps to be accomplished, data collection and analysis plans, etc. Time was also allowed for discussion by all team members. The trial work-sessions were maintained at the duration of one hour as planned for the introductory sessions to be held during the work-session conference. It was at this time that introductory sessions were planned for two hour durations, because the one hour session was found to be too short. During both the trial work-sessions and the activities of the oversight committee project team members played roles simulating what would occur during those activities.

The mini-assessment was followed by the work of the project team to collect data, perform research steps, and improve work-session conference methodology. Particular conferencing methods were examined and attempted in a search for communication stituations which would bring forth from participants an open flow of ideas but which would be structured enough to produce uniformly developed results and conclusions from each work-session group. Conference methods were not completely formulated until the project team had attempted to evaluate several program thrusts by using them.

The completed methodology included the schedule of activities shown in figure 1-4 and the design of record-

TA: Human Rehabilitation Technique
Work Session
Texas Tech University
Lubbock, Texas

SCHEDULE OF ACTIVITIES FOR WORK SESSION

	Monday, July 5
6:00p.m.- 7:30p.m.	Social mixer with snacks.
7:30p.m.-10:00p.m.	Combined group meeting - including introduction, orientation, discussion of scenarios, life functions, rehabilitation techniques, computer models.
	Tuesday, July 6
8:15a.m.- 8:30a.m.	Introduction.
8:30a.m.- 9:45a.m.	Demonstration of using program thrusts.
9:45a.m.-10:00a.m.	Break.
10:00a.m.-12:00a.m.	Work session - familiarization (first program thrust for each group).
12:00a.m.- 1:00p.m.	Luncheon.
1:00p.m.- 5:00p.m.	Work session - first program thrust.
	Wednesday, July 7
8:30a.m.-12:00a.m.	Work session - second program thrust (reiterate first program thrust).
12:00a.m.- 1:00p.m.	Luncheon.
1:00p.m.- 5:00p.m.	Work session - third program thrust (reiterate first and second program thrusts).
	Thursday, July 8
8:30a.m.-12:00a.m.	Work session - fourth program thrust (reiterate second and third program thrusts).
12:00a.m.- 1:00p.m.	Luncheon.
1:00p.m.- 5:00p.m.	Work session - reiterate first, second, third, and fourth program thrusts
6:30p.m.-9:00 p.m.	Attitude adjustment and banquet.
	Friday, July 9
8:30a.m.-10:30a.m.	Presentation of individual work session reports by session leaders.
10:30a.m.-10:45a.m.	Break.
10:45a.m.-12:00a.m.	General discussion.
12:00a.m.- 1:00p.m.	Luncheon.
1:00p.m.- 3:00p.m.	Presentation of final work session reports.
3:00p.m.	Conclusion

Figure 1-4. Schedule of activities for work session

keeping forms for use by all participants at the conference. These forms, which indicate the information assimilated during successive steps of work-session group analysis, are shown in figures 1-5 through 1-11.

LOGISTICS OF THE WORK-SESSION CONFERENCE

The work-session conference was held in a convention-center/motel complex in Lubbock, Texas on 6 July through 9 July 1976.

Work-session leaders and team members met 5 July to coordinate the leadership of the four work-session panels. All participants met during the early evening of 5 July for a formal introduction to the project by team members.

During the first half of the morning of 6 July, work-session participants met for a brief general orientation session and then assembled into particular program-thrust-oriented panels for a two-hour introduction to consequence-analysis procedures. Participants, however, did not meet in the panels to which they had been assigned for the major part of the conference; they met in other panels to simultaneously familiarlize themselves with consequence-analysis procedures and the subject matter considered in panels other than the one in which they would do their major work. After meeting in the familiarization panels for a two hour period, participants reassembled into the panels to which they were

TA: Human Rehabilitation Techniques
Work Session
Texas Tech University
Lubbock, Texas

Date_____

Group:_____

Participant:_____

Program Thrust:_____

Description of Program Thrust and Target Population:

Strategies for Achieving the Program Thrusts:

Asssumptions/Axioms:

Objectives/Performance Requirements:

Figure 1-5. Work session/work sheet number 1

Figure 1-6. Work session/work sheet number 2

TA: Human Rehabilitation Techniques
Work Session
Texas Tech University
Lubbock, Texas

Group: _____
Participant: _____

Program Thrust: _____

IMPLEMENTATION REQUIREMENTS by solution strategy

resource requirement	manpower	professional subprofessional administration	(Major specifications of resource requirements including cost and management requirements)
	money	program facilities construction facilities construction	
	materials	space utilization	government
		equipment	private
	rehabilitation technologies development	basic research	area
		applied research	disabilities
	organizational	centralized	ad. group
		de-centralized	ind. & family
	financial	private	corporate
			state
		government	federal
			local
			population estimation
		eligibility and intake	referral
			eligibility check
	administration control		determination
		program start up	diagnostics
			followup
		program control	monitoring
			accountability
management			with clients
		dissemination	with public
	communication		with other agencies
		information processing	collection
			storage
			retrieval
		centralized	multi purpose
			single
	locus of service		multi disability
			single disability
		decentralized	homebound, outreach
			special centers

Comments space provided here

23

TA: Human Rehabilitation Techniques
Work Session
Texas Tech University
Lubbock, Texas

Group:_____
Participant:_____

Program Thrust:_____

LIFE FUNCTION ANALYSIS (See page 3, Work Book Number 4, for definitions)

Specific effects on each life function:

Effects on disabled not in target group
(specify groups and nature of effects)

Factor of Interest	LIFE FUNCTION				
	Mobility	Health	Communication	Cognitive/ Intellectual	Social/ Attitudinal
Numbers or percent of target group affected					
Disabilities or subgroups of target pop affected*					
Rating of overall effect on LF**					

*Note specific disabilities or subgroups of target population where possible.

**Use a scale with +5=most beneficial, 0=no effect, and -5=most detrimental. Base rating on directions and magnitudes of specific effects identified above.

Figure 1-7. Work session/work sheet number 3

TA: Human Rehabilitation Techniques
Work Session
Texas Tech University
Lubbock, Texas

Group:_____
Participant:_____

Program Thrust:_____

Affected Parties: How party may be affected:

General Population:

Technological Community:

Organizations:

Family:

Other:

Figure 1-8. Work session/work sheet number 4

TA: Human Rehabilitation Techniques
Work Session
Texas Tech University
Lubbock, Texas

Group:_____
Participant:_____

Program Thrust:_____

Consequences/Impacts:

Figure 1-9. Work session/work sheet number 5

TA: Human Rehabilitation Techniques
Work Session
Texas Tech University
Lubbock, Texas

Group:_____
Participant:_____

Program Thrust:_____

Hierarchial/Interrelationship Analysis:

Factor List	Stetch Area
Capability	
Willinginess	
DA Population	
Funds to Social Needs	

SCENARIO

PROGRAM THRUSTS

CONSEQUENCES

Figure 1-10. Work session/work sheet number 6

TA: Human Rehabilitation Techniques
Work Session
Texas Tech University
Lubbock, Texas

Group:_____
Participant:_____

Program Thrust:_____

POLICY CONSIDERATIONS by Scenario

(1) Consider for scenario group number I, then indicate any changes under the other scenario groups.
(2) Identify gaps in "what is needed" and "what is available."
(3) Formulate series of policy considerations.

Related or Affected Program Thrusts:

Are there "harmonious" program thrusts which are consistent and coordinable with the strategies within this program thrust? Would this program thrust lessen the need for or be incompatible with other thrusts? What about "alternative" or "competing" program thrusts?

Figure 1-11. Work session/work sheet number 7

assigned for the remainder of 6 July and the mornings and afternoons of the next two days.

On the evening of 8 July, conference members assembled as one group to hear summary reports from each panel. On the morning of 9 July, subsequent to panel reports, each panel met to (1) revise its report in the light of the reports of other panels and (2) complete any analysis left over from previous panel meetings.

Final reports of the results and conclusions of individual participants and of entire panels were submitted in writing, subsequent to midday, 9 July.

EVALUATION OF WORK-SESSION CONFERENCE

Evaluation of work-session results and conclusions took two forms.

Work-session participants responded to questionnaires designed to determine their own level of satisfaction and confidence in the work of their own panels. Evaluation of responses to the questionnaire, discussed in chapter 6 of this volume, confirms that the confidence level was high.

Work-session conference results and conclusions were retraced and verified by project team members in consequence-analysis meetings subsequent to the conference. The results and conclusions were found to be sound.

CHAPTER 2
ENVIRONMENTAL CHANGE WORK-SESSION PANEL

The environmental change panel investigated two program thrusts: environmental change in the workplace and environmental change affecting the mobility of the disabled within the neighborhood and city. (Figure 2-1 shows how these program thrusts fit into the environmental change program thrust tree.) The branch labeled "1" was considered first by the work session, followed by the branch labeled "2". The branch labeled "3" was considered by members of the technology assessment team at Texas Tech and is discussed in chapter 6 of volume I of this report.

PROGRAM THRUST I: ENVIRONMENTAL CHANGE IN THE WORKPLACE

The first program thrust investigated in the environmental change work session was environmental change in the working environment of the disabled. The program thrust emphasizes change in the architectural design of the workplace.

DESCRIPTION OF TARGET POPULATION

The target population for this program thrust is the wheelchair-bound disabled. The group agrees that a work-site design accommodating the wheelchair-bound disabled also accommodates most other disabled persons.

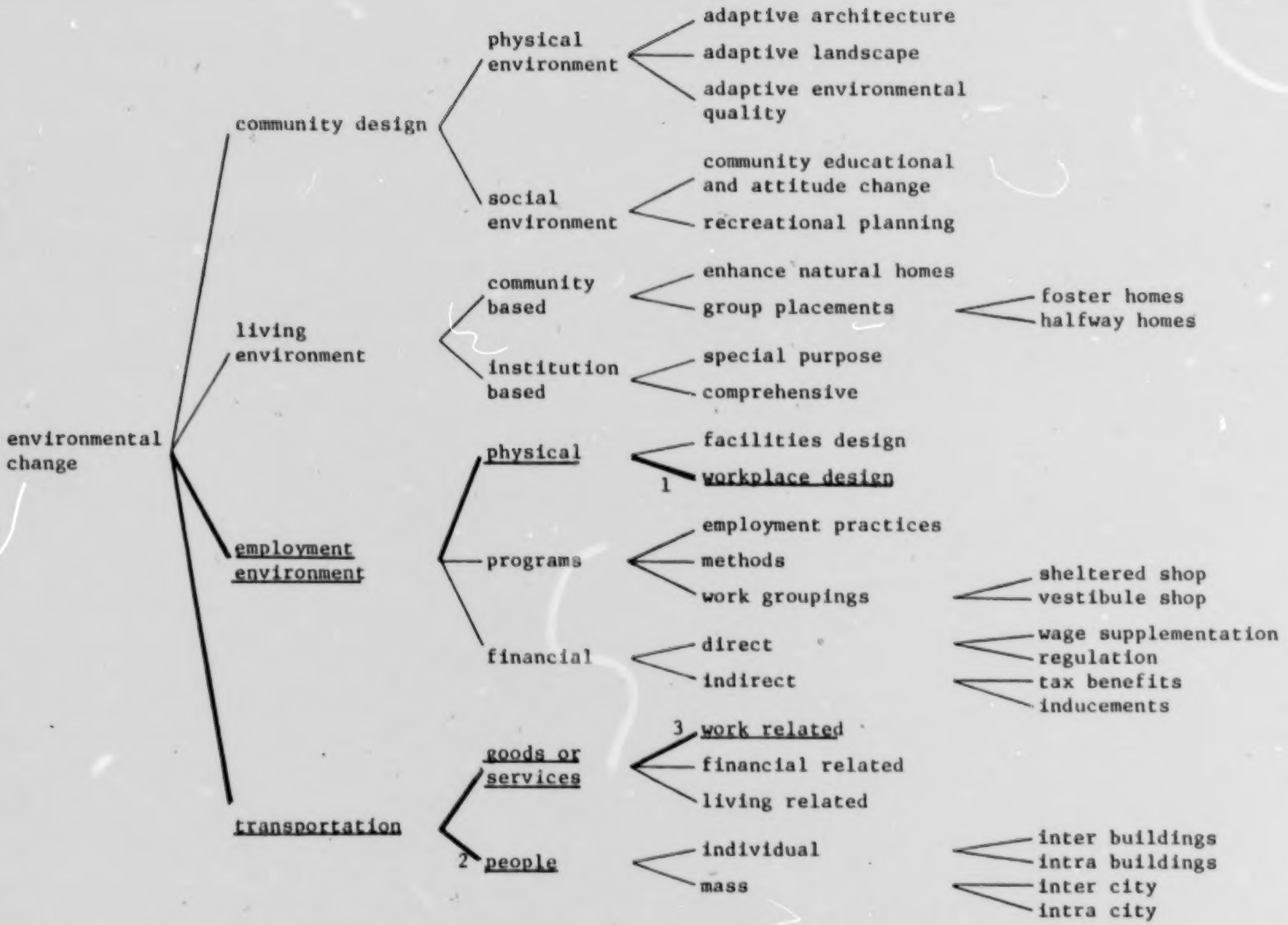


Figure 2-1. Tree diagram: technology levels for environmental change

2-2

STRATEGIES FOR ACHIEVING PROGRAM THRUST

Strategies for changing the work environment of the disabled include both those which affect the exterior of the workplace and those which affect the interior of the workplace. Exterior change includes changes in the approaches to the workplace (including access to transportation) and entrances and exits of the workplace. Interior change in the workplace includes changes in areas involved in preparatory activities (such as time-clock locations and clothes-changing areas), changes in specific work areas, and changes in amenity areas (such as bathrooms and lounges).

Three different strategies may be used in modifying either the exterior or the interior of the workplace. These three strategies include "integration," "semi-integration," and "separation" of facilities and services for disabled workers. Integration involves modifications in the workplace which render it suited to the needs of both the disabled and the non-disabled. Semi-integration involves modifications in the work site which result in semi-separate facilities, work areas, and services for the disabled. Separation involves modifications in the work site which result in work sites (i.e., factories) designed exclusively for disabled workers.

ASSUMPTIONS AND AXIOMS

Assumptions and axioms on which the discussion of projected environmental change in the workplace is based include the following.

1. The workplace may include any type of business establishment, from factories to professional offices.

2. Whatever the specific environment, it must be changed to accommodate the target population, specifically, the wheelchair-bound disabled.

3. Matching jobs to an individual's disability is a possible but inadequate alternative to redesigning of the workplace.

4. Current technology is sufficient to implement design or redesign of the workplace to accommodate the target population.

5. Redesign of the workplace requires the expertise of both architects and engineers working as a team.

6. Effective and efficient work areas for the disabled can be developed.

7. Better design, through a minimum of alteration, can benefit both disabled and non-disabled workers by offering them a better designed workplace.

OBJECTIVES AND PERFORMANCE REQUIREMENTS

The primary objective of the program thrust is the design or redesign of workplaces which can accommodate both the disabled and the non-disabled. A major factor in this objective is the safety and comfort of the work environment for both groups. If safe and comfortable working conditions are guaranteed for both populations, the productivity of both disabled and non-disabled workers should increase. Both of these objectives are directed toward the disabled workers' becoming an integral part of the labor force and thereby being integrated into the community.

IMPLEMENTATION REQUIREMENTS

The most important implementation requirements for the design or redesign of the work environment are money and materials. However, exact costs and needed materials vary widely and cannot be accurately predicted. Foremost among needed materials are construction facilities and clear definitions of space-utilization requirements. Some specialized equipment for disabled workers is also needed. However, most equipment, such as typewriters and hand-held tools require only minimal redesign for use by the disabled.

Manpower is also required for implementation of change in the interior of the workplace. Although sufficient numbers of both architects and engineers are currently available to accomplish the needed design or redesign of workplaces, recruiting them for a project like this one may be difficult without monetary incentives. Manpower needs for implementation of this program thrust also include the disabled themselves, from whom must come the much needed input on specific design requirements.

Another major implementation requirement is centralized reorganization of both governmental and private resources into an efficient management system. This centralized management organization must be responsible for deciding upon eligibility requirements for businesses and organizations seeking governmental "matching funds" for design and redesign

projects. The same management organization may also be responsible for channeling disabled workers to appropriate worksites and for supervising federally funded pilot projects in redesign or design of workplaces suited for both disabled and non-disabled workers.

LIFE-FUNCTION ANALYSIS

Implementation of environmental change in the workplace of the disabled would have positive impact on all five life functions of the target population. By increasing the ability of disabled workers to move about the work site, redesign will increase the mobility of the target population. Such increased mobility may, in turn, have a positive impact upon the health of disabled workers. However, increased mobility may also create a health hazard associated with greater exposure to and risk of injury, depending upon the specific nature of the work environment.

Integration of disabled with non-disabled workers may enhance the communication life function of disabled workers through their increased contact with nondisabled workers and workers with disabilities different from their own. Similarly, job training and work experience will improve cognitive-intellectual functioning by contributing to acquisition of new skills and knowledge by the disabled. Finally, participation of disabled workers in the labor force will enhance their social-attitudinal functioning by enabling them to view themselves as productive members of society.

AFFECTED INDIVIDUALS, GROUPS, AND ORGANIZATIONS

In addition to affecting disabled workers, the projected changes in the workplace will affect the technological community and various organizations. A modest increase in the employment of engineers may result from the need created by the program thrust for physical facility designers and device designers. Other engineers, who will be responsible for assessing variables of the program thrust and for implementing actual changes in the working environment will experience moderate positive impact from implementation of this program thrust. These engineers will also be responsible for developing new applications and research relating to change in the workplace.

Although effects of implementation of the program thrust upon such groups as co-workers of the disabled and unions are difficult to predict, some negative attitudes among both groups are predictable because of increased competition for jobs. In addition, implementation of this program thrust will probably result in increased competition for employees by industries such as Goodwill, in which disabled workers currently make up the bulk of the workforce. Such competition should be insignificant, however, because there are enough disabled workers to fill openings in both types of work environments. Finally, implementation of this program thrust may affect business operations and management within corporate structures as these organizations accommodate their operations

and administration to the new regulations incorporated in the program thrust.

GROUP-DISCUSSION CONSEQUENCES

Among the most important consequences of accommodation of large numbers of disabled workers in more work environments will be a resultant decrease in the need of the disabled for supplemental-income support (link 24, figure 2-2). This decreased financial need will improve the mental health of disabled individuals by allowing them to acquire more positive self-images (link 26, figure 2-2). Along with decreased financial dependence, disabled workers will experience an increase in status among their families and within society in general (link 21, figure 2-2). Employment of disabled persons will also improve the standards of living of their entire families and will result in some change in status for the family as a whole. A further result of increased status among the disabled may be increased "politicization" of that population. In other words, the disabled may use their new labor power to increase their political impact and to demand such benefits as increased accessibility to transportation systems or to vocational and academic training (link 11, figure 2-2).

A possible negative consequence of changes in the workplace to accommodate disabled workers may be increased stigmatization

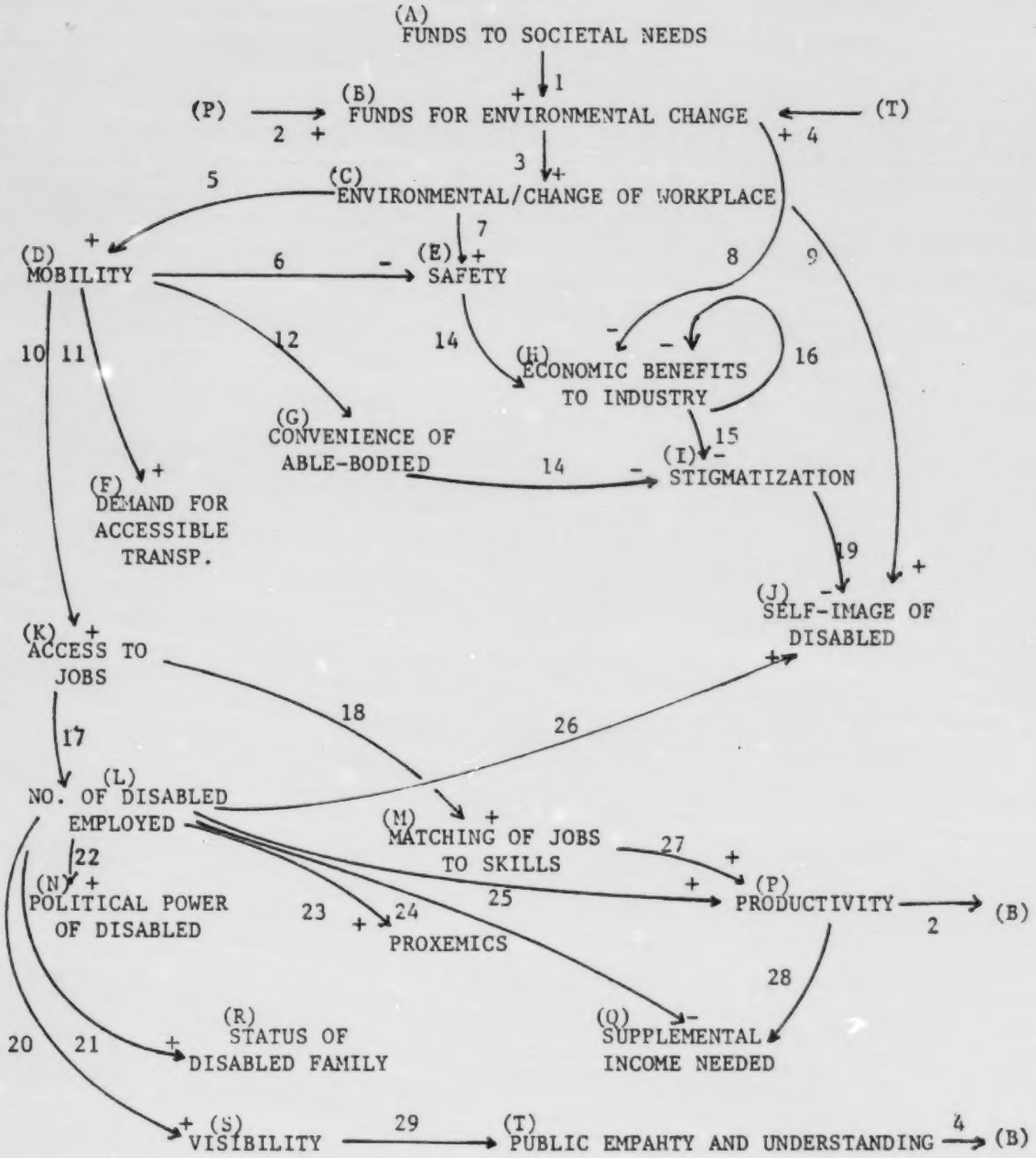


Figure 2-2. Hierarchical and interrelationship analysis of environmental change in the workplace program thrust

of the disabled population because of their greater visibility. However, offsetting stigmatization will be a decrease in pity for disabled persons (link 29, figure 2-2). In addition, as disabled workers begin to compete for jobs on the same basis as nondisabled workers, the nondisabled population may come to increasingly resist changes designed specifically to accommodate disabled workers. Moreover, the disabled workers themselves may resist environmental changes in the workplace if special devices for their use are too cumbersome or too threatening to their job performance.

HIERARCHICAL AND INTERRELATIONSHIP ANALYSIS

A causal diagram showing the results of the hierarchical and interrelationship analysis of the program thrusts of environmental change in the workplace is shown in figure 2-2. In addition to the group-discussion consequences depicted, the figure indicates that an increase in the number of disabled persons employed will increase productivity, proxemics, and visibility. The enhanced access which the disabled would have to jobs and the increased compatibility of the job environment with their needs will cause an increase in demand for education and skills, an increase in the proper matching of jobs to skills, and an increase in the demand for jobs. The figure also shows several potential drawbacks of the program

thrust. For example, additional consideration will have to be given to safety, and the incremental cost of industry to adapt its workplaces safely may contribute to the further stigmatization of the disabled.

COMPUTER-GENERATED CONSEQUENCES

- Additional hazards cause a slight decline in safety first. Gradually, however, safety levels are adjusted to prior standards (figure 2-3).
- Proxemics, mobility in the workplace, political power of the disabled rise in approximate proportion to environmental change in the working environment (figures 2-3, 2-4).
- Demand by the disabled for accessible transportation increases dramatically (figure 2-4).
- While stigmatization decreases, self-image of the disabled increases roughly in proportion to the number of disabled employed (figure 2-4).
- Typically, this program thrust produces moderate increases in the number of disabled employed (figure 2-5).
- While productivity rises somewhat, supplemental income need declines considerably because of the increased number of disabled now holding jobs (figure 2-6).
- Meanwhile the status of the disabled family inincreases along with visibility and public empathy (figure 2-6).
- All of the aforementioned behavior is predicated upon an expanding economy that is able to accommodate moderate increases in the labor force by providing jobs for the disabled (scenarios I and II).

POLICY CONSIDERATIONS

Implementation of changes in the workplace must be undertaken with care and with caution in the use of new and sometimes hastily applied technologies which have impacts

TABLE 2-1
INTERACTION MATRIX FOR ADAPTED WORKPLACE MODEL

Variable	Value	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A-Funds to societal needs	.02																				
B-Funds for environmental change	.10	1.0															.01				0.1
C-EC of working environment	.10		1.0																		
D-Mobility in the workplace	.20			1.0																	
E-Safety	.70			0.5	-.4																
F-Demand for trans	.30				1.0																
G-Convenience of able-bodied	.95				-.3																
H-Economic benefits to industry	.80		-.5						-.5												
I-Stigmatization	.80							-.4	-.4												
J-Self-image - disabled	.30			0.5						-.2											
K-Access to jobs	.20				.4																
L-Number of disabled employed	.20											0.4		0.1							
M-Matching of jobs to skills	.25											0.5									
N-Political power of disabled.	.15												0.5								
O-Proxemics	.05												0.5								
P-Productivity (total)	.50												.05					-.05			
Q-Supplemental income needed	.75												-1.								
R-Status of disabled	.35												0.5								
S-Visibility	.15												0.5								
T-Public empathy	.40																			0.4	

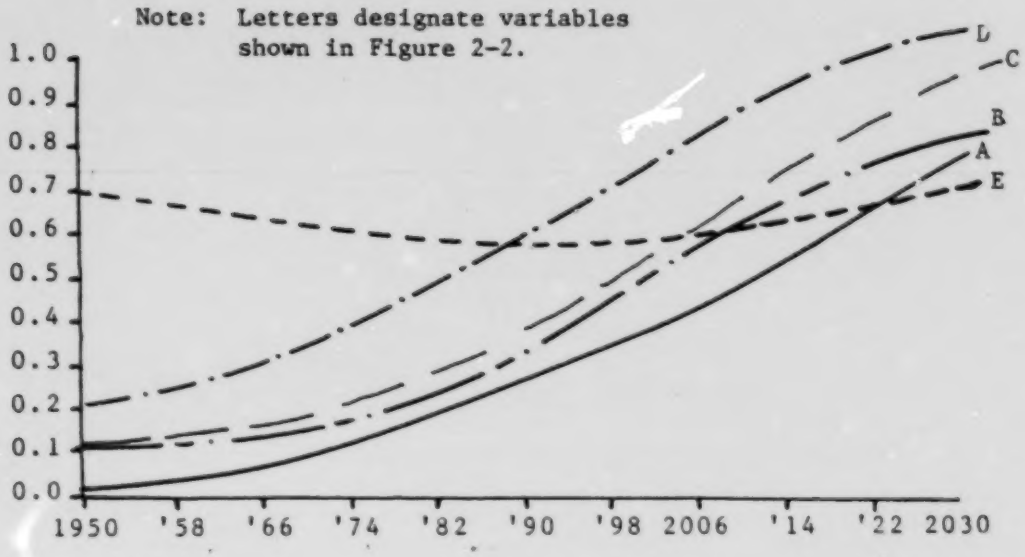


Figure 2-3. Adapted workplace under scenario I and II

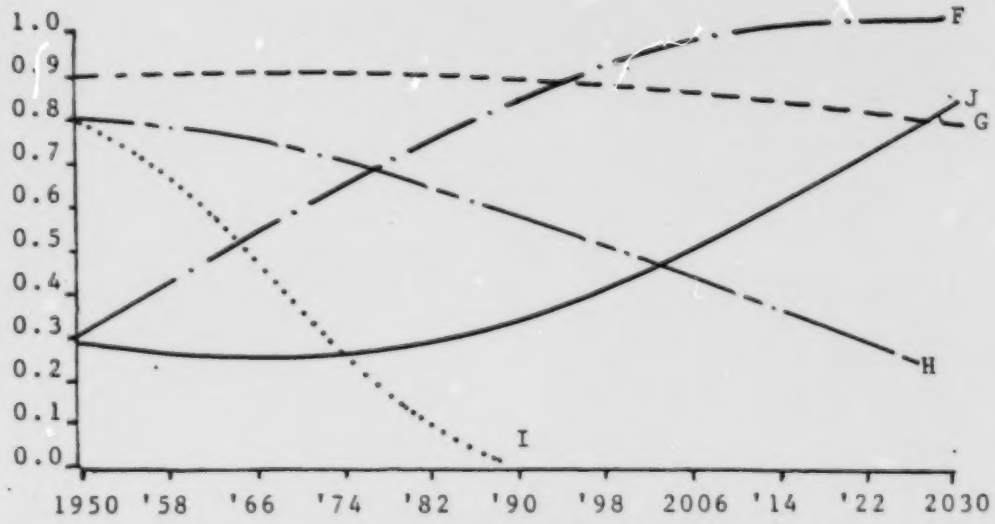


Figure 2-4. Adapted workplace under secnario I and II

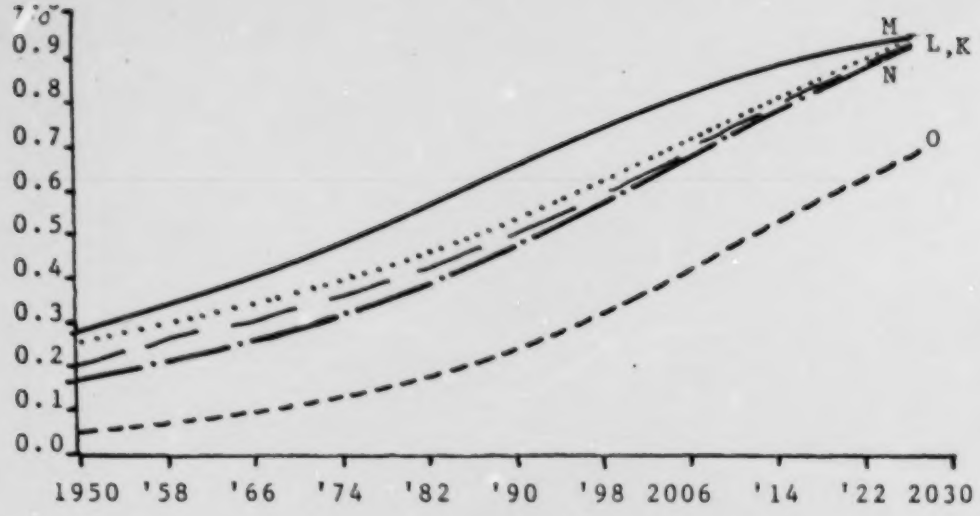


Figure 2-5. Adapted workplace under scenario I and II

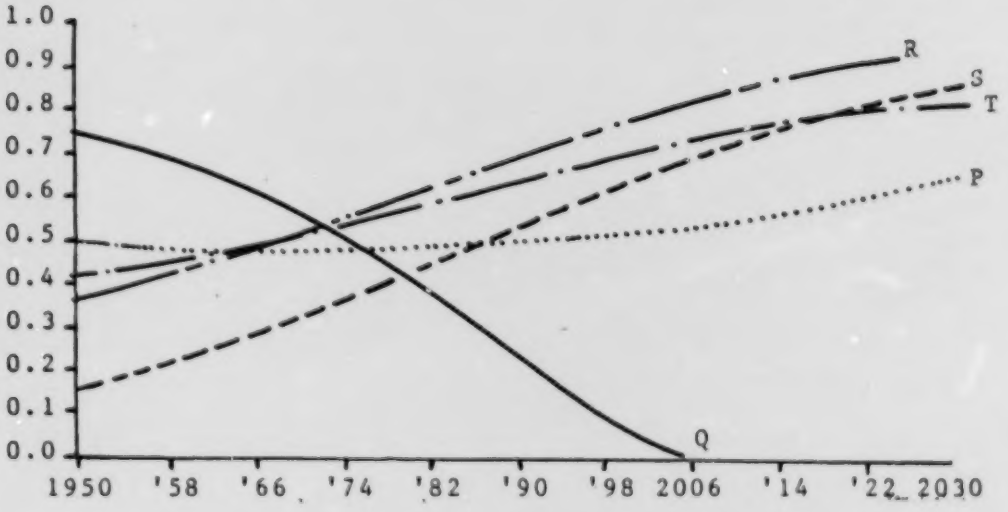


Figure 2-6. Adapted workplace under scenario I and II

not fully analyzed. For example, changes in the work environment will call for increased educational facilities, manpower, and supplies for training the disabled population for their new occupations. These needs, as well as requisite modifications of work sites, will cause increased costs to industry and business (figure 2-4). However, such increased costs may be offset by increased productivity among both disabled and nondisabled workers.

Although specific policy considerations for this program thrust have not been developed, consideration of the effect of this program thrust upon other program thrusts may be highly significant. For example, changes in the workplace may be expected to significantly affect delivery of rehabilitation services through creation of a need for more rehabilitation therapists and counselors. Similarly, a projected increased demand for vocational training for disabled workers will certainly result in an increase in the demand for training and counseling personnel. Possibly, too, new biomedical or surgical techniques may be created to meet the needs of disabled persons who wish to fill jobs in new work areas. Conversely, some group members believe that the need for physical intervention in disability may decrease if the workplace is designed to accommodate the present limiting impairments of the disabled population.

PROGRAM THRUST II: ENVIRONMENTAL CHANGE IN THE TRANSPORTATION SYSTEM

The second program thrust concerns changes in the mobility of disabled persons through changes in the transportation system. Therefore, in this program thrust, the consequences of adapting transportation systems to better suit the disabled are considered with special emphasis upon the resultant increase in mobility.

The various environments within which individuals move include a "micro-environment," a "meso-environment," and a "macro-environment." The micro-environment encompasses the room and the home, and mobility problems within this environment are primarily individual problems. The meso-environment encompasses both neighborhood and district, and mobility problems within this environment apply to both individuals and masses of persons. The macro-environment encompasses the city and all of the environment beyond the city limits.

The main focus of this program thrust is the meso-environment. Within this environment is a compatible balance of both individual and mass transportation and mobility needs. Focusing on the meso-environment involves effective planning for the disabled individual, the general disabled population, and the nondisabled population. It also involves planning for interaction among all of these groups. In addition, this program thrust involves consideration of a number of transportation and mobility problems which occur also within the micro- and the macro-environments.

DESCRIPTION OF TARGET POPULATION

The target population for environmental change in transportation and mobility includes all ambulatory (non-bedridden) disabled individuals. This population is currently estimated to include approximately 15.7 million persons, distributed in varying concentrations in different communities. Some communities, notably "retirement" communities, have much higher concentrations of the target population than do others.

STRAGETIES FOR ACHIEVING PROGRAM THRUSTS

Whatever specific strategy is adopted in providing greater mobility for the target population, the strategy must incorporate provisions for each of the following needs.

1. Mobility needs related to daily living, or basic "survival" activities.
2. Mobility needs related to employment and education, or "betterment" activites.
3. Mobility needs related to recreational and social, or "fulfillment" activities.
4. Mobility needs related to economic, or "maintenance" activities.

ASSUMPTIONS AND AXIOMS

Implementation of changes in the mobility of disabled persons within the meso-environment is based on the following assumptions and axioms.

1. Meeting the transportation needs of the disabled is a matter of concern to society in general because of the possibility that anyone may, at any moment become disabled.

2. The disabled population has the same rights and privileges within society as the nondisabled population.

3. Currently, the equality of rights and privileges among such groups as the disabled is nullified by nature of our pluralistic, democratic society, which the serving of interest groups is in direct portion to the potential power they wield.

4. Insofar as improvements for the disabled population have positive impacts upon the nondisabled, the power of the disabled as an interest group will increase.

5. The technology is currently available for implementation of improvements in the mobility and transportation of the disabled.

6. The implementation of changes in the mobility and transportation for the disabled must ensure safety in transit for both the disabled and the nondisabled.

7. The accessibility of the environment to the disabled population can be increased only through changes in existing transportation systems through removal of constraints (obstacles, barriers, route limitations) which currently limit mobility of disabled persons.

8. Types of disabilities, types of intervention, and consequences of intervention upon both the disabled and the nondisabled populations must be analyzed as a continuum.

OBJECTIVES AND PERFORMANCE REQUIREMENTS

The overall objective of changes in the mobility of disabled persons within the meso-environment is to increase the range of mobility choices for meeting various needs within the disabled population. Specifically, consideration must be given to living needs, economic needs, employment and educational needs, and recreational needs. The way in which these needs are met will create among the disabled feelings of independence, self-reliance, and self-determination. In

addition, the mobility choices of the disabled will be increased in a way that increases the visibility of the disabled population and promotes interaction between the disabled and the nondisabled population. A primary goal of such interaction is to create among the disabled a feeling of belonging to society at large. The meeting of any or all of these objectives is dependent upon technologies relating to transportation and mobility being integrated to simultaneously serve the needs of both the disabled and the nondisabled populations.

IMPLEMENTATION REQUIREMENTS

Implementation of environmental change in the mobility and transportation of disabled persons is dependent primarily upon manpower for developing, operating, and controlling mobility and transportation technologies. In addition, some additional facilities will be needed for the implementation of this program thrust, although the basic materials and infrastructure are already available. The acquisition of additional manpower and facilities will, in turn, generate a need for a decentralized management system, with local authorities being responsible for standardization of services. All of these changes, if they are to be successful, must be implemented in a conceptual framework which is multipurpose, multiobjective, and multijurisdictional.

Cost of implementing the program thrust have not been specifically predicted, but they have been analyzed as including expenditures in three major categories: (1) costs

associated with design and creation of the system, (2) costs associated with implementation, maintenance, and development of the program thrust, and (3) costs associated with enforcement of the program thrust.

LIFE-FUNCTION ANALYSIS

Effects of implementation of the program thrust upon the life functions of the disabled include both positive and negative impacts, with an overall positive effect. The major positive impact will, of course, occur within the mobility function, since the very nature of the program thrust is to facilitate the movement of the disabled throughout the environment. Health will also be positively affected, since mobility is generally associated with muscular exercise and coordination in some form. In addition, increased mobility will also provide greater access for the disabled to health-care facilities. However, some degree of negative impact upon health is to be expected from the increased exposure to health hazards, such as infection, and injury which accompany increased mobility.

Cognitive-intellectual functioning will improve as a result of increased mobility, which provides the disabled greater access to schools, meetings, museums, and entertainment. Increased interaction with society in these and other settings as a result of increased mobility will positively affect the communication life function of the disabled.

However, increased interaction with the nondisabled population may result in vacillations in the social-attitudinal functioning of the disabled, depending on whether such interaction engenders positive or negative responses in either population.

AFFECTED INDIVIDUALS, GROUPS, AND ORGANIZATIONS

Increased mobility of the disabled may be expected to affect many other individuals, groups, and organizations in society. Within society in general, increased mobility of the disabled may be expected to affect neighbors of the disabled, other users of mass transportation, and taxpayers. Increased visibility of the disabled may result in positive, negative, or vacillating reactions among neighbors, depending largely on the personality of the individuals involved. A strong negative reaction to increased mobility of the disabled may be expected among fellow users of mass transportation if increased mobility of the disabled involves special privileges for the disabled or inconvenience to other users of the transportation system. Likewise, if taxpayers are required to pay for increased mobility of the disabled, they are likely to have negative reactions to the program thrust. In general, a polarization of social attitudes towards the program thrust may be expected.

Within the technological community as a whole, the program thrust will probably have minimal effect. The main impact

will occur within the transportation industry, which will have primary responsibility for implementation of the program thrust. Within this industry, a positive impact may be expected because of increased employment opportunities and revenue associated with production, maintenance, and control of vehicles to be used in implementing the program thrust.

Organizations within society will be both positively and negatively affected by implementation of the program thrust. Businesses will be positively affected by the market expansion accompanying increased access of the disabled to their facilities. However, some negative impact would be felt as a result of necessary adaptations to facilities in order to accommodate the disabled clientele.

Other affected organizations include those which currently provide the bulk of transportation services to the disabled population--volunteer organizations and commercial taxicab services. Both of these organizations will probably experience reduced need for their services as a result of an increase in alternative forms of transportation for the disabled.

Families of disabled persons will be affected in various ways by increased mobility of disabled family members. In some cases, family members upon whom disabled persons have formerly relied for transportation and mobility needs may be threatened by the increased independence and self-reliance of the disabled member. In other cases, non-disabled family members may be relieved at no longer having to provide for a disabled member's transportation needs.

Another group within society which may be affected by increased mobility of the disabled includes members of other minorities. The increased visibility of the disabled may bring about decreased attention to differences between disabled persons and other members of society, and hence may bring about decreased noticeability of all minority groups.

GROUP-DISCUSSION CONSEQUENCES

The primary result of increased mobility for the disabled will be an alteration of psychological and physical "maps" of the environment. Increased mobility within the micro-, meso-, and macro-environments will result in proportional "shrinking" of the world to match the functioning of the disabled. This type of change, referred to as a change in "proxemics," will result in a restructuring of the "mental maps" of the disabled population. Physical maps, too, will be restructured as facilities within the homes, the neighborhood, and the city are redesigned to accommodate the mobility needs of the disabled. Redesign of these facilities will in turn necessitate new concepts of space utilization within these environments, and hence, redesign will necessitate alterations in the spatial concentration of neighborhoods and in the design of urban areas.

Another significant effect of increased mobility for the disabled is increased visibility of the disabled and increased interaction between disabled and nondisabled members of society.

This increased visibility and interaction will, in turn, affect the willingness of the nondisabled to further implement the program thrust. Feelings of either empathy or resentment toward the disabled will probably be magnified with increased visibility, and these feelings will vary among the micro-, the meso-, and the macro-environments, with greatest polarization within the meso-environment.

Increased mobility of the disabled will utimately have an effect on the economy. An increase in the capabilities of the disabled will accompany improved mental health and feelings of self-worth resulting from increased mobility. These increased capabilities will, in turn, result in an increase in the variety of jobs available to the disabled and in the number of the disabled who enjoy full employment. The net result will be an increase in productivity and standards of living among the disabled population, which will ultimately be reflected in a higher gross national product.

Political consequences also are probable as a result of increased mobility among the disabled. As communication among disabled individuals is facilitated by increased mobility, they will be better able to create interest groups and to become involved in organized lobbying in pursuit of their specialized interest.

HIERARCHICAL AND INTERRELATIONSHIP ANALYSIS

A hierarchical and interrelationship analysis of the program thrust dealing with environmental change in mobility is shown in figure 2-7. The rationale for the interrelationships is as follows.

As funds are allocated to adapt and provide special transportation facilities for the disabled, there will be an attendant increase in the mobility of the disabled, which in turn will precipitate a host of additional reactions. Increased mobility can be expected to cause increased accessibility of jobs, increased visibility, and increased proxemics for the disabled. Increased accessibility of jobs can be expected to increase the number of disabled employed, and the demand for the necessary training and skills. Increased visibility will cause a reaction (either adverse or empathetic) on the part of the public, which could affect the continuing willingness of society to fund such programs. As more and more disabled become employed, there will be a lessening of supplemental income required and an increase in productivity; however, unemployment could be affected adversely, and in a recession there would be increased competition for the limited jobs. As the disabled become more integrated into the workforce and community, it is expected that they, as a group, will increase their political lobbying capacities to secure programs of interest to them. In addition to increased access to jobs, increased visibility, and increased proxemics, increased

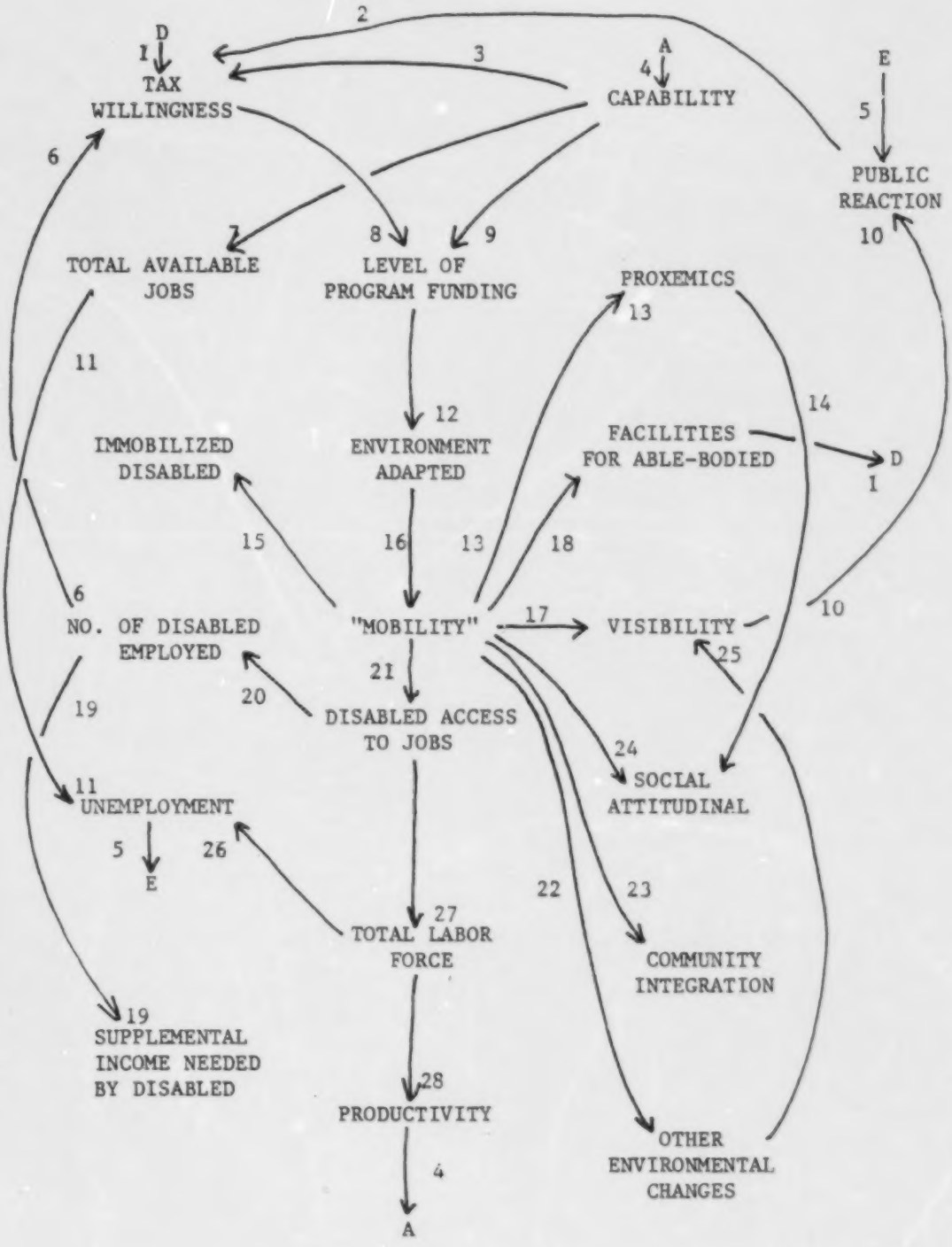


Figure 2-7. Hierarchical and interrelationship analysis of environmental change in mobility

mobility is expected to improve the other four life functions, to lessen the number of immobilized disabled, and to increase community integration.

COMPUTER-GENERATED CONSQUENCES

Results of computer simulation are depicted in figures 2-8 through 2-12.

The results, briefly described, are as follows.

- The most directly affected life function is mobility.
- The incremental gain in mobility due to change in only transportation facilities is moderate but not substantial (figure 2-8).
- Visibility increases substantially (figure 2-8).
- The incremental gain in proxemics is quite substantial (figure 2-9).
- Public reaction is somewhat negative especially in the reduced-growth scenario (figure 2-9).
- When willingness outstrips capability, there is an increase in unemployment (figure 2-10) and 2-11), because there are many more employable disabled persons but no jobs.
- The program increases productivity and decreases required supplemental income in all scnearios (figure 2-10, 2-11, 2-12).
- Under the reduced-growth scenario, this program causes a substantial increase in unemployment (figure 2-12).
- There must be coordination and harmony in the administration of programs for the following reasons.

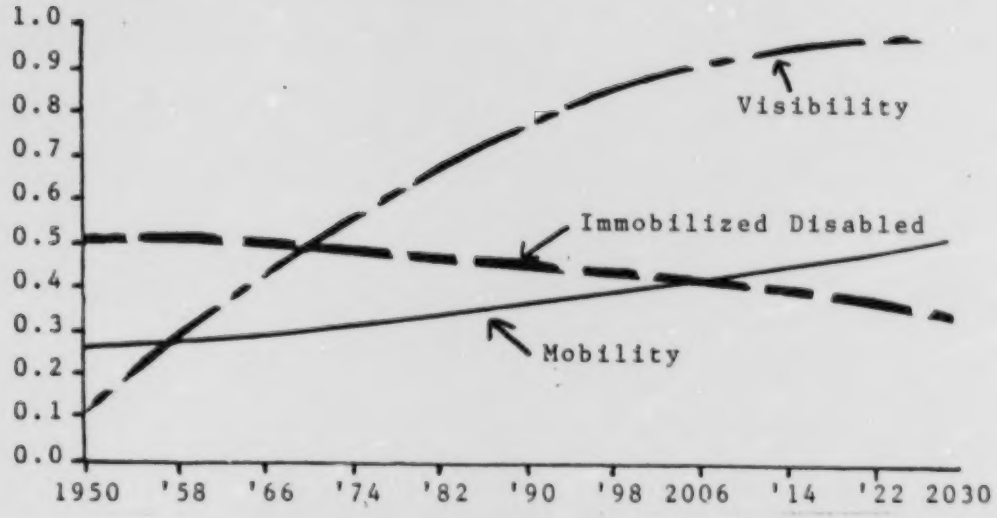


Figure 2-8. Adapted transportation under scenario I

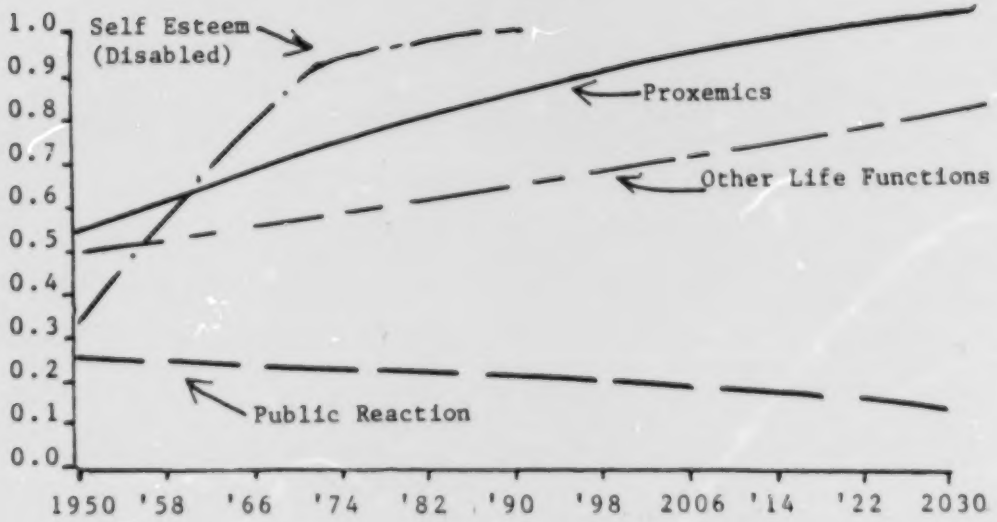


Figure 2-9. Adapted transportation under scenario I

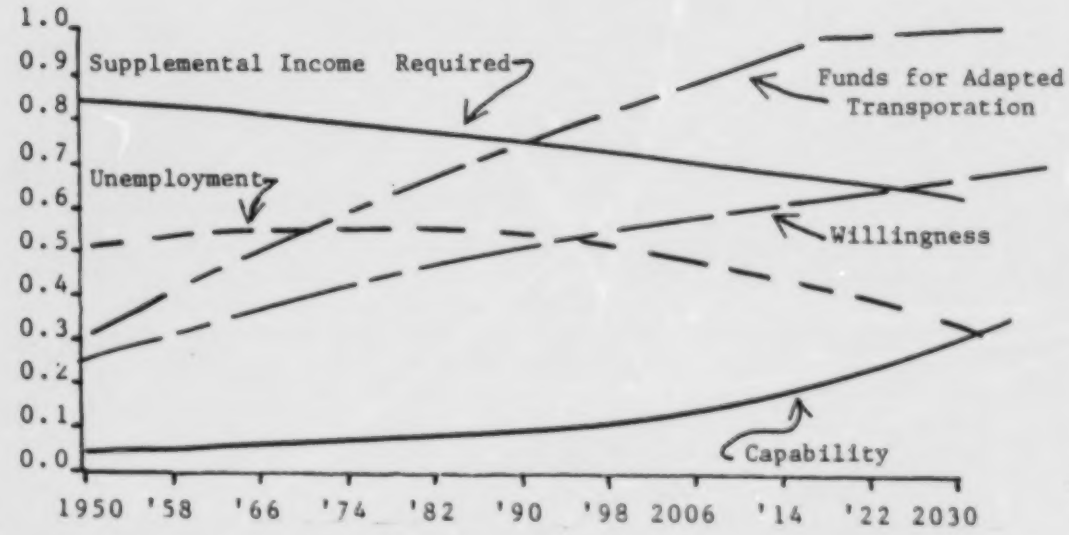


Figure 2-10. Adapted transportation under scenario I

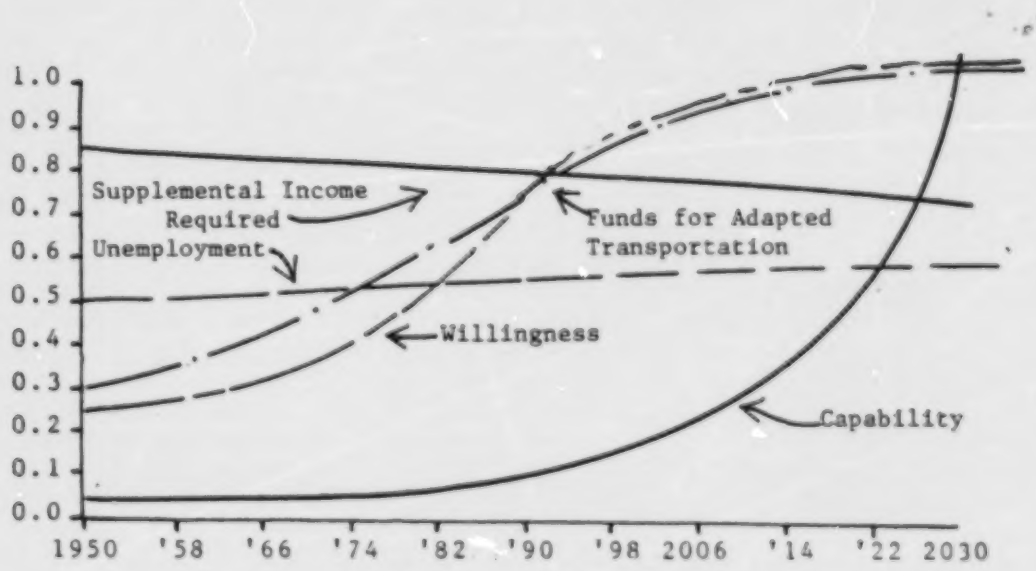


Figure 2-11. Adapted transportation under scenario II

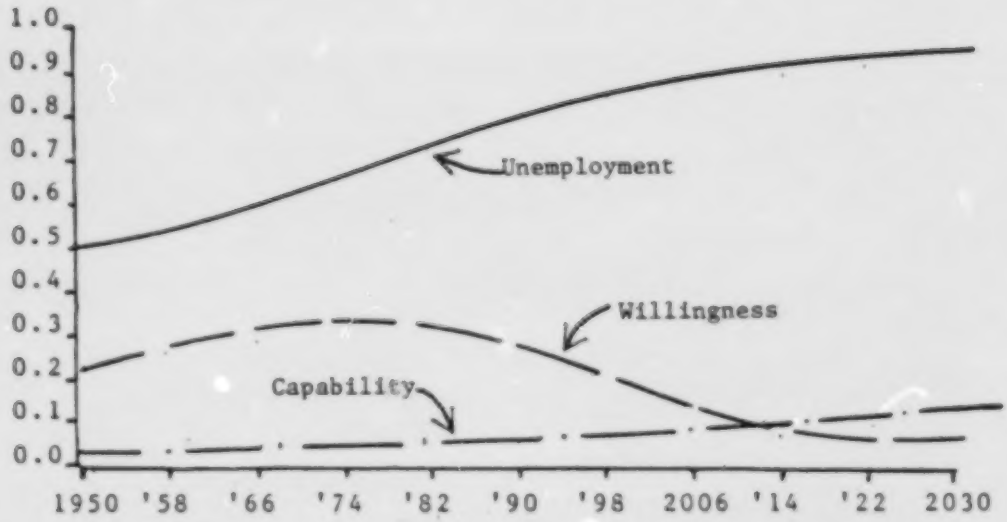


Figure 2-12. Adapted transportation under scenario II

1) Little is gained when the disabled are incorporated into the labor force by rehabilitation programs if there are no jobs available.

2) Little benefit is derived from giving the disabled access to jobs if they are not also trained to assume the positions of employment that are available in society.

3) Little benefit is derived from adapting transportation facilities if places of employment and public buildings are not also appropriately modified to enable access by the disabled.

POLICY CONSIDERATIONS

Implementation of a program thrust for increasing the mobility of the disabled involves several significant policy considerations relating to the following factors: manpower, technological and physical design, guidelines and standards, and socio-political behavior.

An effective manpower policy involves the identification, mobilization, and utilization of individuals affected by the program thrust. This ideal is very much in contrast to the current situation in which essentially non-productive programs act as counter-incentives for the disabled population. Avoiding a perpetuation of this stagnant situation will require the development of a "new ethos" incorporating new incentives and mandates in the economic, social, and ethical spheres of life.

A related need is an informational one. The data base, containing information about disabilities and environmental

change, must be expanded, and this information must be disseminated to policymakers, to industry, and to the general population. The availability of such information will greatly facilitate the necessary interdisciplinary approach to problem solving related to environmental change.

The current state of technological and physical design capability constitutes another major area of concern to policymakers. Although current basic technology can implement environmental change for mobility of the disabled, the lack of monetary incentives has resulted in a significant gap between basic knowledge within the field and application of this knowledge. New incentives must be devised not only to facilitate the application of current technologies, but to foster the development of new and innovative technologies.

Careful consideration must also be given to guidelines and standards for the creation, implementation, and enforcement of the program thrust. Although some legal guidelines are currently in use, these are minimal, as is any enforcement mechanism. Cooperative, standardized legal mandates will be necessary to ensure enforcement of the program thrust. Moreover, incentives for compliance must be increased through either stronger negative or stronger positive reinforcement.

Policymakers must also be well informed on social and political behavior patterns. Both they and the general public

must become informed about the nature of disability if positive attitudes and social behaviors are to evolve. In addition, the disabled themselves must become more politically astute, developing new strategies to promote their acceptance among the nondisabled population. They must create a strong group-identify which will enable them to form an interest group with the ability to mobilize fo political power.

A final major policy consideration relates to cost of implementation of the program thrust. A recognition must be made of the fact that implementation involves a transfer to resources from other areas or involves sacrifices within society.

CHAPTER 3
PHYSICAL INTERVENTION WORK-SESSION PANEL

The physical intervention group studied two program thrusts: the use of physical therapeutic agents and the use of rehabilitation devices.

PROGRAM THRUST I: PHYSICAL THERAPEUTIC AGENTS

Physical therapeutic agents are used to implement biomedical change within physical intervention. As shown in figure 3-1, they are distinct from agents of chemical change (including drugs), and they differ from dietary strategies which effect biomedical change.

DESCRIPTION OF THE TARGET POPULATION

The target population includes persons whose disabilities have resulted from the following causes.

Stroke	Emphysema
Spinal Cord Injury	Cancer
Cerebral Palsy	Kidney Disease
Epilepsy	Diabetes
Arthritis	Hearing Impairments
Coronary Heart Disease	And possibly others

The target population was not artificially limited to these specific disability groups, however, because many other disability groups can benefit from therapeutic agents which benefit these specific groups.

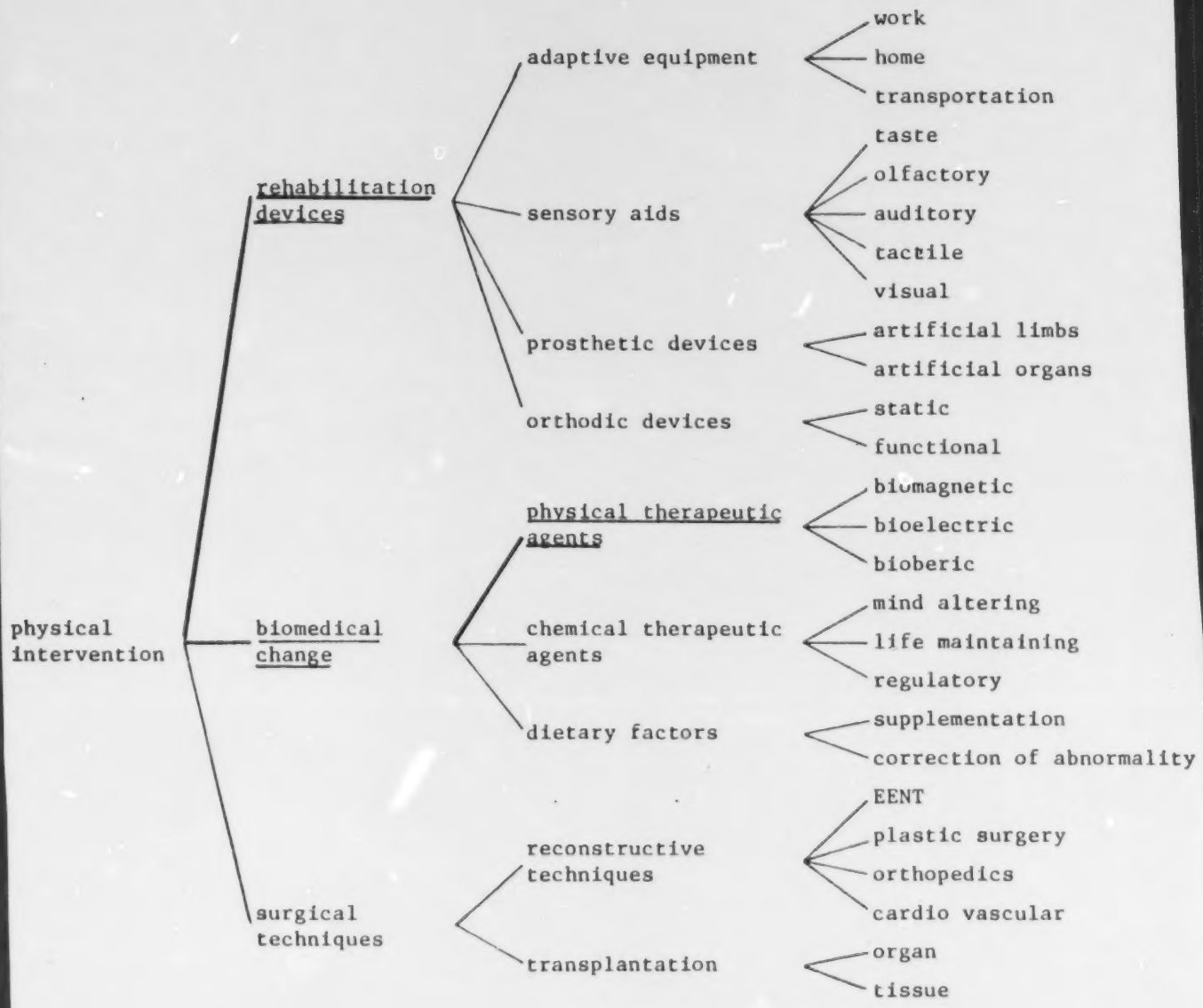


Figure 3-1. Tree diagram: technology levels for physical intervention.

STRATEGIES FOR ACHIEVING PROGRAM THRUSTS

Strategies for achieving the program thrust were selected according to two criteria. Each strategy must induce or contribute to biological change within the target population, and each must be either therapeutic or diagnostic. Therefore, five strategies were chosen in accordance with the following five principles underlying therapeutic agents.

Magnetics
Electronics
Mechanics
Electromechanics
Thermionics

These strategies include measures to inhibit disabling factors as well as measures to eradicate the disabilities. Magnetic fields induced into the limbs of the disabled, for example, temporarily relieve circulatory problems, just as magnetic fields also inhibit enzyme activity and facilitate bone healing. Electronic devices such as pacemakers inhibit the disabling effect of erratic nerve impulses on the heart, and electromechanical valves and locks in prosthetic devices substitute for disabled biological mechanisms.

ASSUMPTIONS AND AXIOMS

Assumptions and axioms underlying the analysis of physical therapeutic agents include the following.

1. The technology for implementing this program thrust is already in various stages of development and application.

2. Physical therapeutic agents do in fact have beneficial effects upon the disabled; many of them are not products of "quackery."

3. There is a good acceptance of physical therapeutic agents among some persons, but there is a poor acceptance among others.

4. More critical evaluation of research and development efforts supporting physical therapeutic agents is needed.

5. In some cases, the market for physical therapeutic agents is very small.

6. Many therapeutic agents are very expensive, and development and implementation of these agents can be motivated only by social pressure.

OBJECTIVES AND PERFORMANCE REQUIREMENTS

Within the broad goal of applying physical therapeutic agents so that they have a positive effect upon the disabled population, specific objectives and performance requirements are threefold. First, the program thrust must minimize the debilitating biological effects of disability. Second, the program thrust should increase the supply of therapeutic agents through increased funding, through fair distribution of funding to permit development and through reduction of cost by technological breakthrough (rather than through "cost containment"). Third, the program thrust should minimize the dependence of the disabled upon other types of treatments (such as drugs).

IMPLEMENTATION REQUIREMENTS

To be successfully implemented, this program thrust requires manpower, materials, technological development,

financial capability, organizational techniques, and provision for continued utilization and maintenance.

The program thrust requires manpower for substantive development, implementation, and maintenance, and it requires manpower for management.

Rehabilitation professionals are required for the overall development and use of physical therapeutic agents. In support of these professionals, subprofessionals are required for technical design, production, implementation, and maintenance of devices. Paraprofessionals as well are required to assist physicians and to train and instruct users of the devices.

Material requirements for development and implementation of physical therapeutic agents may be very demanding. Rare materials and unusual space-utilization requirements are results of applying currently available technologies to rehabilitation. Such demanding requirements are seen in the use of physical therapeutic agents in weightless environments, the use of hyperbaric chambers, and the use of therapeutic electromagnetic fields. Even with the application of technology exotic to the rehabilitation field, however, material resources do not appear to be as demanding as manpower resources.

Requirements in technology are also apparent. There is a very great need for the application of currently developed technologies within this program thrust.

Although the emphasis in technological research at a national level has shifted to applied research, application

has not been particularly oriented toward rehabilitation. In contrast, basic research directed at the development of concepts useful to the development of applied technology is still very much required. For maximum benefit to the disabled, a continuum of research from basic to applied is necessary.

Financial resources for development, implementation, and maintenance will obviously be great because of the requirements for manpower and materials. Money, either as a resource or as a claim on resources, is intimately bound up with administration and management of the program thrust. With a program so demanding, the federal government must provide for research and development, but there is a great possibility that business and industry will become viable financial channels once development is underway. The cost of utilization and maintenance, however, is highly variable and therefore unpredictable. It is reasonable that private enterprise can be responsible for the manufacture and for some aspects of the utilization of physical therapeutic devices.

Administration and management within this program thrust grows out of traditional agencies, such as the Federal Food and Drug Administration within the area of monitoring. There is no necessity for traditional agencies to manage programs in support of physical therapeutic agents, however, and there is no indication that centralized management is required. Management will inevitably take form from the application of

of laws, and the most probable form of management is decentralized control within legal and administrative guidelines and regulations.

LIFE-FUNCTION ANALYSIS

The overall effect of a program thrust promoting physical therapeutic agents is positive for all five life functions. Benefits within the social-attitudinal and mobility life functions appear the greatest.

Physical therapeutic agents will provide a highly beneficial effect for the disabled affected by motor difficulties, and they provide a very likely beneficial effect upon persons with chronic diseases. There is a slight benefit for persons with behavioral impairments.

Mobility will substantially improve for persons with motor disorders, and it will most significantly improve for persons with chronic diseases.

Communication will improve for the behaviorally impaired, while it will improve slightly for persons with motor and sensory impairment.

The cognitive-intellectual life function improves for persons with behavioral impairments, while it improves slightly for persons with motor and sensory impairment.

The health life function improves markedly for persons with chronic diseases, but for other persons it shows very little effect.

The only potentially negative effect on a life function that is possible from physical therapeutic agents is on the social-attitudinal function for the chronically diseased. Although unlikely, it is possible that radically improved health and mobility bring about loss of self-esteem through broader exposure within the nondisabled community.

AFFECTED INDIVIDUALS, GROUPS, AND ORGANIZATIONS

Programs implementing the thrust promoting physical therapeutic agents have a broad effect throughout the general population, the technological community, numerous organizations, the family, and other social and political groups.

Within the general population, neighbors and peers of the disabled are affected by the improved life functions of the disabled. Taypayers are affected by financial demands, and the structure of the community surrounding the disabled is likely to change to accommodate changes among its members. Nondisabled employees are likely to be affected by a greater employment potential for the disabled. As the service delivery system supporting physical therapeutic agents grow, resulting in greater employment, a corresponding growth in quackery can also be expected. Furthermore, from increased mobility and health, employees of the transportation industry become more numerous.

The technological community, in general, prospers. The computer industry develops new devices, primarily computers and telecommunication equipment. Telecommunication devices,

in turn, require an increased number of bioengineers. Within rehabilitation technology, there is an increased need for application personnel such as physical therapists, and there is a greater need for basic rehabilitation research. Rehabilitation technology also requires a greater number of paraprofessionals and fields of paraprofessional activity, as well as a greater acceptance of paraprofessionals by society. Rehabilitation technology is also required to answer a large number of research-utilization questions about cost effectiveness and to provide cost-benefit analyses. Educational technology is required to develop revised curricula to provide for education and training associated with new physical therapeutic agents. The transportation technologies must develop new concepts and support devices required by greater mobility and health, and the architectual-technology community must prepare new buildings and modify presently used buildings for use by persons wearing electromagnetic devices. (The construction industry, too, must be prepared to build according to new designs and to modify existing structures.)

Organizations affected by this program thrust include medical, educational, legal, health-care, and governmental organizations. Within the medical profession, there must be more funding for and accelerated development of an "early-warning system" to reduce the lag time associated with the utilization of new devices. Both medical and educational professions must provide additional education and training

brought about by basic and applied research in therapeutic devices. Education and medicine must be better prepared to accept technology which appears "quackish" but is in actuality sound. The legal profession must resolve legal issues relating to priorities in use of therapeutic devices such as dialysis machines and life-preservation equipment, and the legal profession must be prepared to handle the additional demands on services required by lawsuits within a new area. Health-care professionals must accommodate a new delivery system which accepts both disease and disability services, and they must prepare for a decrease in population in institutions for the mentally retarded and other disabled persons. Health-care institutions must prepare for the implementation and maintenance of new technology by employing staffs including engineers and technologists prepared to handle the new techniques. Greater staffing within federal agencies is required for an additional monitoring function. Transportation organizations must be provided with an increased staff trained to handle new mobility and health problems. Many other organizations must accommodate the increase of income within the disabled population, and they must prepare for the disabled becoming a more effective political force through lobbying.

Families must prepare for an increased number of options available to the disabled through increased mobility and income. These options place heavy or extreme demands on the traditional family structure surrounding the disabled. Within the family,

the disabled individual develops increased self-esteem. Moreover, an increase expenditure for therapy is taken on balance with an increase of family income caused by greater productivity for the disabled. Similarly, better health for the disabled provides decreased expenditure for health care. Lessening the effect of disability within the community--for example, in the removal of architectual and social barriers--promotes a demand by the disabled for lessening the effect of such barriers within the family. The concept of disability is less central to family operation, the conjointly in creased number of disabled persons living at home because of deinstitutionalization affects the family.

Other organizations and groups are also affected. Economic groups may be affected by change in the "balance of payments" shift resulting from the import and export of new therapeutic devices. Legislatures may be affected by increased mobility and health among the disabled. Some far-reaching effects may even result in therapists' resenting technology in diminishing their roles in rehabilitation.

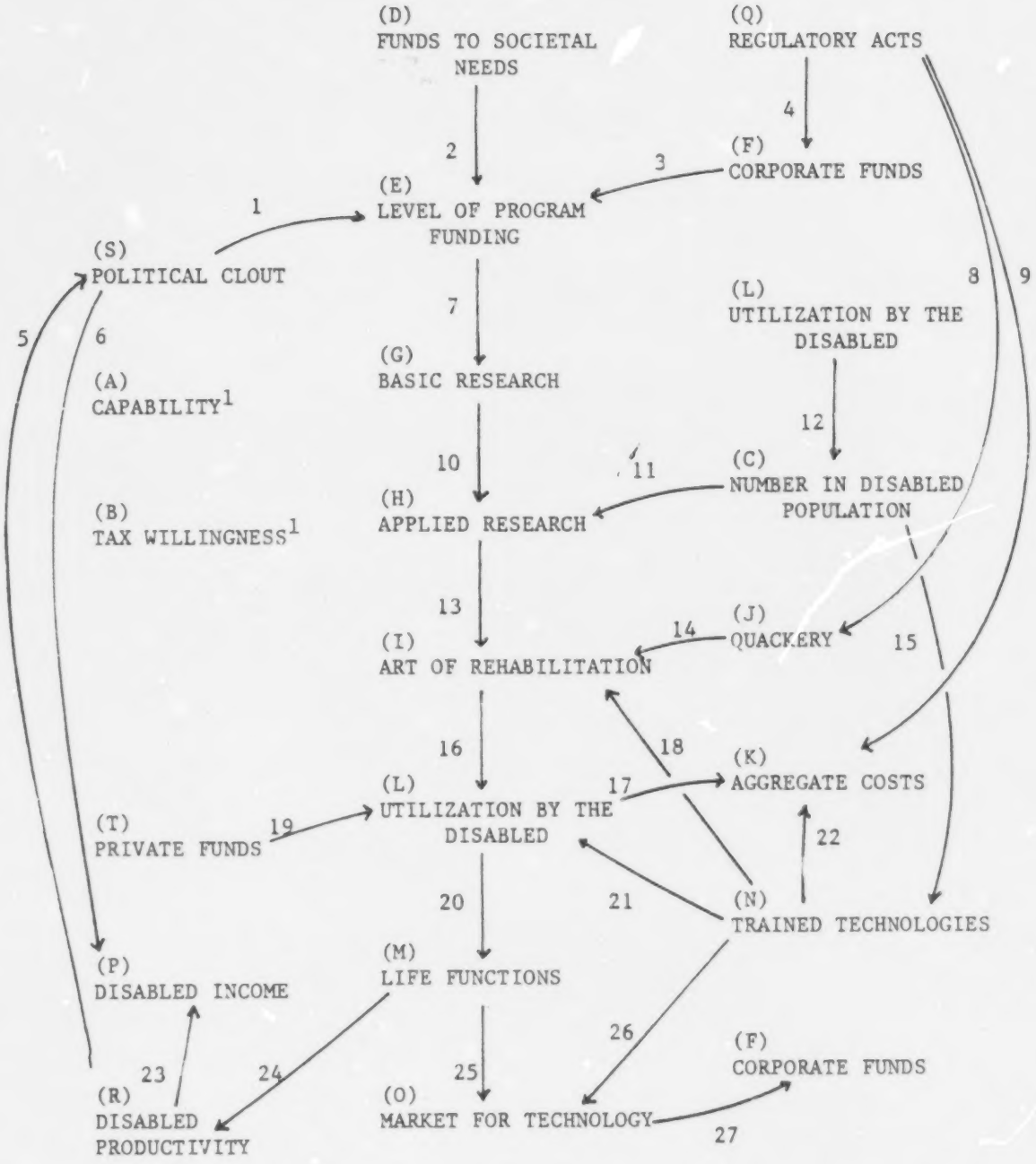
GROUP-DISCUSSION CONSEQUENCES

A program thrust promoting physical therapeutic agents does benefit the disabled by increasing their expectancy for an improvement in quality of life, as shown in link 20, figure 3-2. The disabled, in second-order reaction, offer increased

demands for services and benefits, as shown in link 17, figure 3-2. To meet new demands and expectations indicated by link 1, figure 3-2, government must reorder spending plans for social needs, especially to make benefits available within the time frame in which the disabled and the general population expect them to be available.

Other direct effects of implementing a policy thrust promoting physical therapeutic agents include several institutional changes. Service-delivery institutions grow and reorganize in accordance with demand, although some decrease among traditional institutions caring for the "unrehabilitatable" disabled can be anticipated. As shown by link 15 in figure 3-2, the engineering, medical, and educational professions undergo change as the demands for supporting technological development, implementation, and maintenance are placed upon them. Links 7 and 10 in figure 3-2 show that policies must shift to accommodate increased emphasis on research and development and new facilities.

Indirectly, the disabled, because of greater mobility and better health, have a correspondingly greater need for services and benefits heretofore available to the nondisabled; demands are made on vocational institutions, transportation, and education, for example, as shown in link 5, figure 3-2. Further, the disabled become "organized" and become a much more visible minority as shown in link 1, figure 3-2, leading to their being a target for "backlash" among members of the



[1]These variables were used for threshold evaluation only

Figure 3-2. Hierarchical and interrelationship analysis of physical intervention, physical therapeutic agents

majority. The disabled benefit society through greater productivity during working years as shown in link 24, figure 3-2. There is, however, a possible increase in hereditary disorders brought about by increased marriage and family activity by some disabled persons.

HIERARCHICAL AND INTERRELATIONSHIP ANALYSIS

A causal diagram showing the results of the hierarchical and interrelationship analysis performed by the working session is shown in figure 3-2. In addition to the group-discussion consequences, the figure shows that a long series of enhancement links must be followed to get increased life functions from increased funds to societal needs. Several variables cause a diminution in other variables. For example, while regulation causes a diminution in quackery, it also increases aggregate costs. Several positive feedback cycles are shown in the diagram. One of these cycles is shown in the links between *level of program funding, basic research, applied research, art of rehabilitation, utilization by the disabled, life functions, disabled productivity, political clout,* and *level of program funding.* Another, shorter positive feedback cycle is shown in the links between *utilization by the disabled, life functions, disabled productivity to disabled income,* and *utilization by the disabled.*

An important aspect of the causal diagram is the significance of the links and cycles to the long-term dynamics of the interactions.

COMPUTER-GENERATED CONSEQUENCES

Computer simulation, as shown in figures 3-3 through 3-6 indicates that unwanted changes are shown for several variables. Corporate funds (F) are driven to zero by regulatory acts (Q). Rehabilitation (I) declines through the influence of quackery (J). Desired changes are shown for other variables, but not to the degree expected. Life functions (M) improve, but slowly. Disabled productivity (R) increases by a negligible amount. Aggregate costs (K) experience a strong growth and would eventually reach the limiting value of 1.0. The GSIM model indicates that for the variable interactions identified and the strengths of the couplings used, the possible dynamics for this structure are rather pessimistic. Possible improvements in dynamics could be obtained by a policy of careful application of regulatory acts which would prevent diminished input from corporate funds, and by a strengthening of the coupling between funds to societal needs and utilization by the disabled. Table 3-1 contains the interaction matrix used for the computer simulation.

POLICY CONSIDERATIONS

The consequences of a program thrust promoting physical therapeutic agents indicate that there are six areas of policy-making that are crucial to development of the program thrust. Economic disincentives for developing, implementing, and maintaining physical therapeutic agents must be eliminated by changes in the law. Regulatory agencies must take a positive approach to stimulate growth in the development of

TABLE 3-1
CROSS-IMPACT MATRIX FOR PHYSICAL THERAPEUTIC AGENTS MODEL

Variable	Value	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A-Capability	.22																				
B-Tax Willingness	.03																				
C-DA Population	.12												0.1								
D-Funds to Soc Needs	.02																				
E-Level of PGM Fund	.05				.15		.10													.05	
F-Corporate Funds	.05															.30		-.20			
G-Basic Research	.10					.05															
H-Applied Research	.10			.15				.05													
I-Art of Rehab.	.30								.30		-.15				.05						
J-Quackery	.80																	-.20			
K-Aggregate Costs	.05												.10		.10			.20			
L-Utilization by DA	.05									.30					.05						.05
M-Life Funct. of DA	.05												.30								
N-Trained Workers	.20			.10																	
O-Market for Tech.	.08													0.1	.05						
P-DA Income	.60																		1.0	.30	
Q-Regulatory Acts	.50																				
R-Productivity of DA	.05													.30							
S-Political Clout	.20																		.10		
T-Private Funds	.10																				

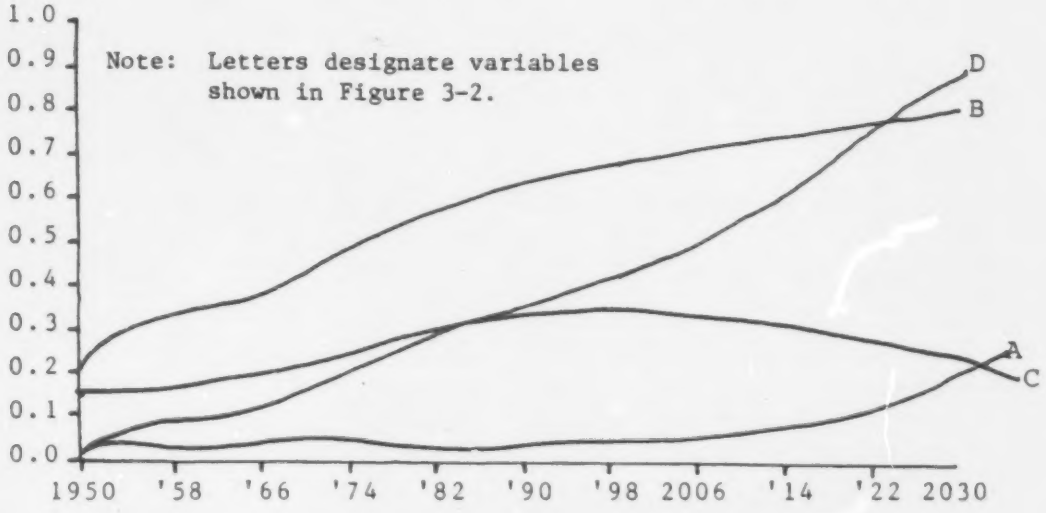


Figure 3-3. Physical therapeutic agents, variable dynamics

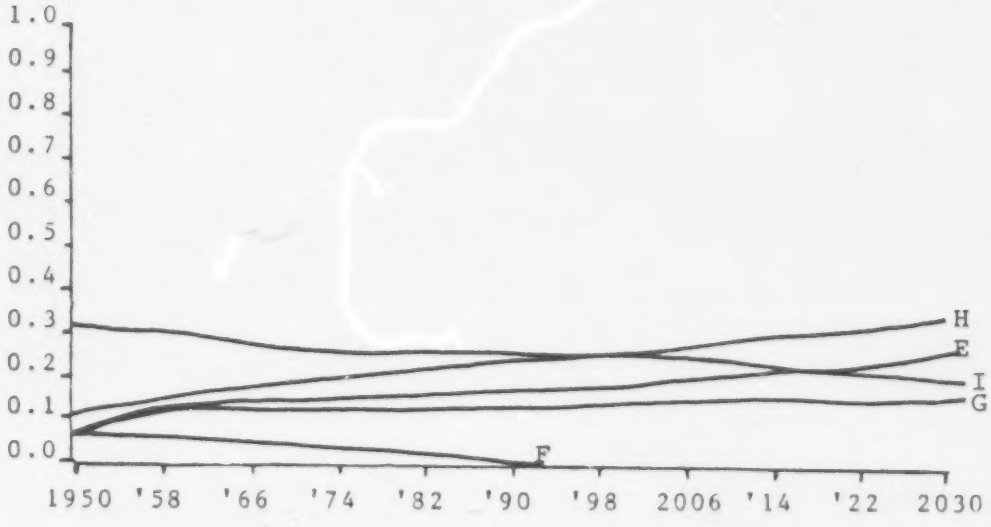


Figure 3-4. Physical therapeutic agents, variable dynamics

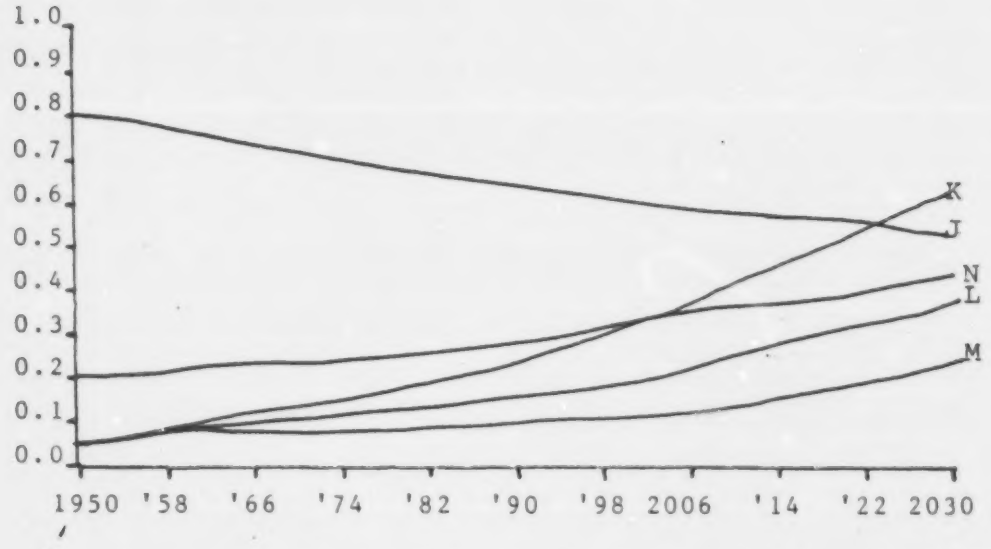


Figure 3-5. Physical therapeutic agents, variable dynamics

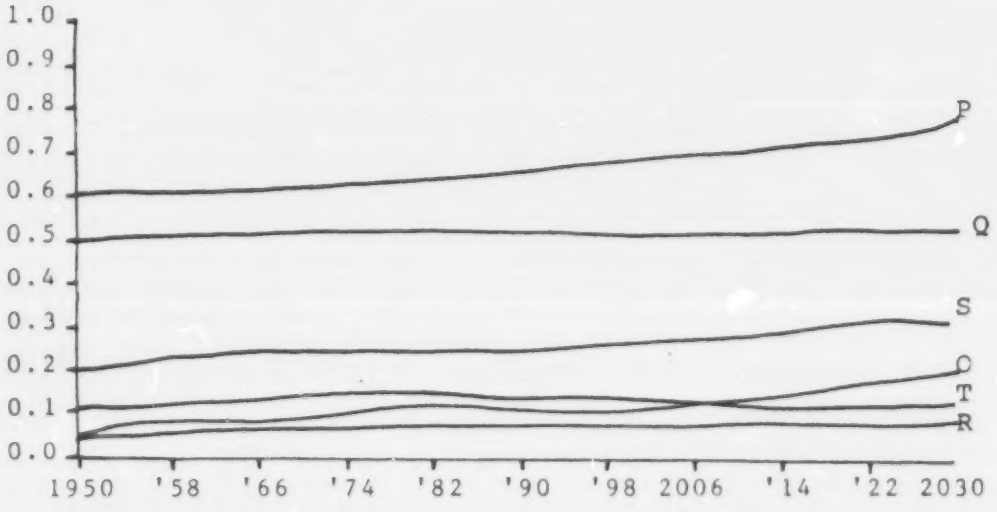


Figure 3-6. Physical therapeutic agents, variable dynamics

physical therapeutic agents. Government must bear the responsibility for "seeding" in order to stimulate growth of programs within the program-thrust area, particularly in view of the great requirement for resources for development. The development of beneficial agents and devices must be based on solid engineering technology for maximum beneficial impact.

Centralized governmental monitoring must be provided within a federal agency in order to coordinate development, implementation, and maintenance of physical therapeutic agents among decentralized service-delivery agencies. Also, for direct policy-related monitoring, the government--with the help of the professions and the service-delivery system--must establish a provider-consumer structure to ensure controlled and fair growth within development and allocation practices.

PROGRAM THRUST II: REHABILITATION DEVICES

Rehabilitation devices are constituent within physical intervention with the program thrusts of biomedical change and surgical techniques as previously shown in figure 3-1.

DESCRIPTION OF THE TARGET POPULATION

The target population includes members of all disability groups for whom the strategies of the rehabilitation-devices program thrust are beneficial.

STRATEGIES FOR ACHIEVING PROGRAM THRUSTS

The program thrust promoting rehabilitation devices includes strategies using the following: adaptive equipment, sensory aids, prosthetic devices, and orthodic devices.

ASSUMPTIONS AND AXIOMS

The development of this program thrust within the four strategies is based on the following axioms and assumptions.

1. Rehabilitation devices for use in these strategies are currently available.
2. These devices, as they are currently available, can be improved.
3. These devices are presently available on a continuum which ranges from prototype to highly developed and marketable stage.
4. Many of these devices are simple.
5. The rehabilitation-devices program thrust requires sophisticated engineering for development.
6. Electronics is the most promising area of rehabilitation-device development.

OBJECTIVES AND PERFORMANCE REQUIREMENTS

The overall objective of this program thrust is to permit normal life functions among the disabled. Rehabilitation devices are, in general, designed to result in immediate enhancement of the capabilities of disabled persons and to avoid, for example, the life-function disabling paradox inherent in long-term rehabilitation techniques. These devices restore, create, or simulate normal functioning within the disabled individual.

Rehabilitation devices are related directly to life-function impairment; they are designed to minimize the role played by this impairment in overall individual and social areas (vocational, familial, educational, and so forth).

IMPLEMENTATION REQUIREMENTS

Successful implementation of the program thrust dealing with rehabilitation devices requires resources primarily in the areas of manpower, research, and management.

The greatest resource need within this program thrust is in the area of manpower. By 1980, for example, the nation will be producing only one third the manpower needed in the management of prosthetic or orthodic devices. Both educational manpower for the training of skilled personnel and technical manpower for the operating of new equipment are needed in large numbers. A major reason for the high manpower requirements in this program thrust is that the required ratio of professionals to patients is very high in comparison to, for example, the required ratio of special-education teachers to students. A further manpower need is for the creation of new roles for professionals, subprofessionals, and paraprofessionals. Some of the anticipated roles for such persons do not presently exist, and new role models must be created.

Clearly, much new research is required in the implementation of the program thrust dealing with rehabilitation devices. Although some of this research may be classed as "basic" and other research as "applied," within this particular program thrust, differences between the two are more political than substantive. Certainly, the direction of research within this program thrust does not represent a smooth continuum from basic to applied research. Rather,

applied research within this program thrust often points up needs for basic research which may be one or several steps removed from the applied level.

Management resources within this program thrust will continue to come from both the public and the private sectors of society. Because of this shared management scheme, a major need exists for coordination of the dissemination and utilization of information, particularly research and development information. Many of the developments in the field of rehabilitation devices have occurred within the private sector--for example, the development of myoelectric arms and joint devices. Conversely, at least one third of amputee prosthetic devices have been VA supported. Clearly, a management scheme is needed which ensures optimum dissemination and utilization of developments within both sectors.

LIFE-FUNCTION ANALYSIS

The overall effect of a program thrust promoting rehabilitation devices is positive for all five life functions. The greatest effects, in terms of both numbers and degree, are in the mobility and social-attitudinal life functions.

Mobility is very significantly improved for persons with motor disabilities, significantly improved for persons with sensory disabilities, moderately improved for persons with chronic diseases, and slightly improved for persons with behavioral disorders.

The social-attitudinal life function is very significantly improved for persons with motor disorders and persons with sensory disorders, significantly improved for persons with chronic diseases, and very slightly improved for persons with behavioral disorders.

Health is very significantly improved for persons with chronic diseases, moderately improved for persons with motor disabilities, and very slightly improved for persons with behavioral disorders. The health of persons with sensory disorders is unaffected.

Cognitive-intellectual life functions are most significantly improved for persons with sensory disorders, and they are slightly improved for persons with both mobility and behavioral disabilities. The cognitive-intellectual functioning of persons with chronic diseases is not likely to be affected.

Communication life functions are most significantly improved for persons with sensory disorders. The communication life function is slightly improved among persons with motor disabilities, very slightly improved for persons with chronic diseases, insignificantly improved for persons with behavioral disorders.

The mobility of approximately 4 million disabled persons is improved, and the social-attitudinal functioning of approximately the same number is also improved. The health of approximately 2 million is improved, and the communication and cognitive-intellectual functioning of 1 million is improved.

AFFECTED INDIVIDUALS, GROUPS, AND ORGANIZATIONS

The general public will be affected by the tax burden necessary to finance the program thrust. Taxes must finance both research facilities and production of specific devices for disabled users. This increase in public-financed health-care cost, however, may be offset by a decrease in welfare cost made possible by greater productivity from the disabled. Within strictly social and political areas, rehabilitation devices make the visibility of the disabled greater at the same time that these devices place the burden of more comprehensive decision making upon the policymaker and the general public. Deciding who shall use rehabilitation devices and how the devices are provided (essentially, what the service-delivery system is) can be a significant problem in equity. Economic and sociopolitical problems with rehabilitation devices may be lessened for the general public and the policymaker by the prospect of use of the devices by the general public as well as by the disabled.

Although quackery with rehabilitation devices is much less a problem than it is with physical therapeutic agents, rehabilitation devices nevertheless present a possibility for economic exploitation. Exploitation by the technological community--both moral and immoral--is possible because of the drastic need for the devices. In addition, rehabilitation devices are not so closely tied to the medical profession as are physical therapeutic agents, and this leads to

less-adequately monitored transactions involving the technological community. Research duplication is another problem within the technological community. The nonmedical nature of rehabilitation devices encourages lack of research coordination and leads to a lack of cost effectiveness, despite efforts by the National Research Council. Aside from these potential drawbacks, the technological community prospers from the increased opportunity to design new devices.

Among organizations, the medical profession and the health-care organizations must gear up for rehabilitation-device developments by the establishment of an "early warning system" which alerts professionals to new devices. With rapid technological development under this program thrust, time lag could be disastrous for individual disabled persons. The insurance industry may be affected by a demand from disabled persons requiring rehabilitation devices without the means of obtaining them. State governments may be affected by the lack of uniformity in means for obtaining rehabilitation devices; however, state governments are only one part of the service-delivery system which may be affected with accelerated rehabilitation-device development.

The effect of promoting rehabilitation devices upon the families of the disabled is profound. Families require less funding and resource allocation for health care, and hence they may allocate resources for goods and services of their

choice. Increased mobility for families including disabled persons also produces profound consequences.

GROUP-DISCUSSION CONSEQUENCES

Most of the consequences for a program thrust promoting rehabilitation devices are identical to the consequences of the program thrust promoting physical therapeutic agents. The primary consequences of this program thrust, obviously, are the therapeutic benefits to the disabled, particularly among such high-density disabled populations as the elderly. A direct result of these benefits is a change in the population of institutions and an increase in the demand for providers of new types of services, along with an inevitable time lag in the delivery of these services.

In addition, as the program thrust is implemented, changes take place both in governmental policies and in medical and engineering support professions. A reordering of governmental spending is essential for successful implementation of the program thrust. Accompanying new spending priorities are new policy guidelines to facilitate and regulate implementation of the program thrust. Within the support professions such as medicine and engineering, increased public awareness and control result in higher quality services and decreased "quackery."

A long-range effect of a program promoting rehabilitation devices is an eventual lessening within the population of

distinctions between the disabled and the non-disabled. The disabled gain greater access to the work place, for example. However, as they do so, new types of problems are raised within the work environment, such as restrictions on the use of rehabilitation devices within certain locations.

HIERARCHICAL AND INTERRELATIONSHIP ANALYSIS

The working session re-examined the analysis for physical therapeutic agents and concluded that it was applicable throughout the program thrust tree. Therefore the causal diagram of figure 3-2 and the associated computer-generated consequences may be viewed as general for the physical intervention program thrust.

POLICY CONSIDERATIONS

The consequences of a program thrust promoting rehabilitation devices indicate that there are four major areas of policymaking that are crucial to development of the program thrust. One area of particular concern is policies relating to the elderly because this group constitutes an especially large percentage of the target population. Specifically, the increased independence of elderly persons within society as a result of rehabilitation devices must be weighed against the societal impact of a large-scale diversion of funds to a generally "nonproductive" segment of the population. Policymakers must determine the extent to which the elderly are to receive priority within the program thrust.

A second area of major concern to policymakers results from the increased participation of disabled persons in the workforce. Some equitable means must be provided for insurance of these disabled workers, and legislative support may be required to ensure such equitable coverage. Such support might consist of legislation requiring private companies to underwrite the special risks of the disabled worker, or it might consist of legislation mandating federal underwriting of these risks. An advantage of the second method is that it would enable the federal government to gather data on the actual costs and risks associated with employment of disabled workers.

The international ramifications of implementation of the program thrust constitute a third major area of concern to policymakers. Presumably, extensive importation or exportation of rehabilitation devices could affect the United States balance of payments. In addition, some alteration of existing tariff regulations might be necessary if implementation of the program thrust is to be cost-effective. A further result of international market exchange of rehabilitation devices might be a need for an alteration of United States regulations and standards for such devices.

Similar policy changes may also be needed in the fourth area of policymaking concern--free access to and exchange of information in the development and use of rehabilitation devices. Currently, a large part of the development of

rehabilitation devices takes place outside the medical profession. For example, the electronics industry has played a large part in the development of many communications and regulatory devices. However, the dispensing of such devices is still almost exclusively the prerogative of the medical profession. If this program thrust is to be implemented, better avenues of exchange of information must be provided, and perhaps some loosening of the legal restrictions on dispensing of the devices will be needed. One innovative means of facilitating both of these goals would be the licensing of a new type of professional, the engineering practitioner, whose capabilities and interests would bridge the gap between technology and medicine.

CHAPTER 4
TRAINING AND COUNSELING WORK-SESSION PANEL

The training and counseling group dealt with two very specific program thrusts, beginning at the most specific level of the program thrust tree. The heavy branches shown in Figure 4-1 identify the program thrusts considered by the training and counseling work session.

PROGRAM THRUST I: PRESCHOOL ACADEMIC EDUCATION

The first program thrust investigated in the training and counseling group was the academic education of the preschool disabled.

DESCRIPTION OF TARGET POPULATION

Extrapolation from statistical support data places the number of disabled students in the nation's schools at 10 percent of total enrollment in 1980. When this 10 percent figure is applied to the total population under 5 years of age, a potential target population for preschool academic education for the disabled is estimated to be 1 million. However, because a program of preschool academic education undoubtedly involves the parents of disabled preschoolers, these parents are identified as a secondary target population. In addition, adults other than parents may be involved in preschool education and would, hence, constitute a tertiary target population.

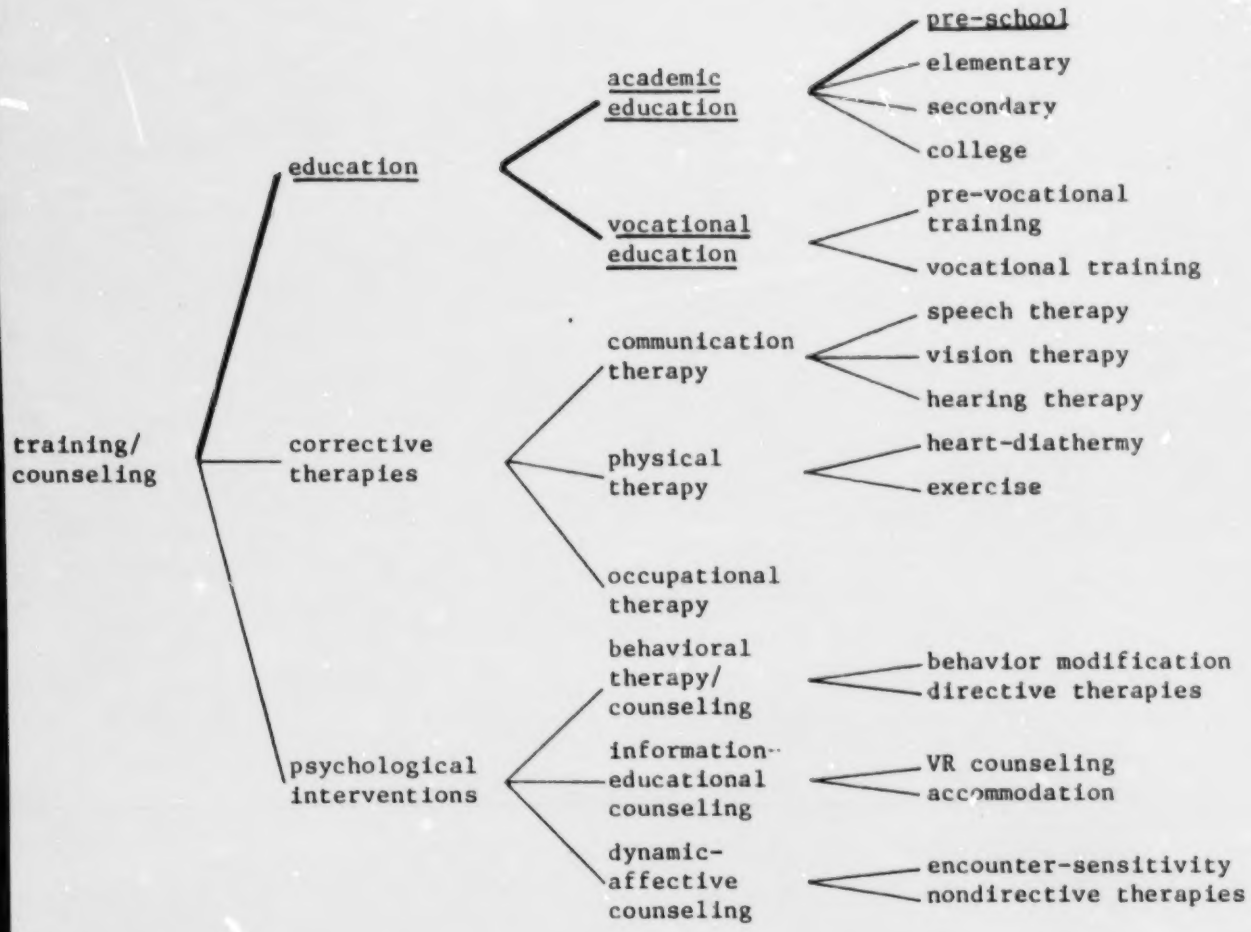


Figure 4-1. Tree diagram: technology levels for training/counseling.

STRATEGIES FOR ACHIEVING PROGRAM THRUST

One of the primary benefits of a preschool program derives from early identification of and intervention in the disability. Among the target population are various types of disabilities which are susceptible in varying degress to positive change in extent of the disability.

ASSUMPTIONS AND AXIOMS

A program of academic education for disabled preschoolers is based on the following assumptions and axioms.

1. Although the technology exists for identification of many types of disabilities among the target population, some types of disabilities among preschoolers are presently unidentifiable through existing technologies.

2. Early intervention in the form of identification, preventive treatment, and corrective treatment and training is desirable.

3. Part of the technology for accomplishing such early intervention already exists, but further technologies must be developed if the program is to succeed.

4. This program is more likely than are some others to attract public support because of the appeal of helping children.

5. The age at which identification and training of disabled persons is begun determines the level of improvement eventually realized in overcoming the disabling condition.

6. Maintaining a child in the child's home is generally preferable to institutionalizing the child.

7. The bulk of funding for this program must be derived from public resources because of both economic and administrative considerations.

8. Because of foreseeable negative consequences of a compulsory program, participation in the program must be voluntary.

OBJECTIVES AND PERFORMANCE REQUIREMENTS

The ideal program of preschool academic education is organized around a decentralized system of "disability centers" strategically located throughout the country. These centers should deal with all types of disabilities and should be administered through a central agency. The resources of the regional centers should be devoted primarily to implementing a home-centered program of education for disabled preschoolers. Ideally, the resources of these centers will be used primarily within the homes of the disabled.

IMPLEMENTATION REQUIREMENTS

Funding for such a widespread program will almost certainly have to be government funding. The level of funding obviously will determine the precise nature of the program thrust. Negative impacts of a comprehensive program of preschool education may include effects on similar programs already in existence.

Implementing a comprehensive program of preschool education for the disabled entails making some use of existing technologies. However, it also entails development of new technologies in areas such as diagnosis and evaluation.

Based on current figures for per-pupil costs of education for disabled pupils in schools, the estimated cost for the preschool education program is projected at $1000 per student

per year. For a target population of 1 million individuals, the total cost of such a program is $1 billion per year. Start-up costs are not differentiated from operating costs in this figure.

Somewhat offsetting the costs of this program are economic benefits resulting from improved life functions for the disabled. Future increases in the graduation rates and incomes coupled with decreases in unemployment and welfare costs for the disabled may diminish the net costs of the program somewhat.

Full implementation of the preschool education program may occur as early as 1990, at which time the cost will be $1 billion per year.

LIFE-FUNCTION ANALYSIS

Among benefits of the preschool education program are improvements in all of the life functions of both children and parents. The greatest benefits may accrue in the health and social-attitudinal life functions of the two groups. Through early intervention, many disabilities can be identified and corrected, with the result that a child and his parents can look forward to a disability-free future. In addition, preschool academic education may result in improved self-concepts for both parents and children, enhancing the ability of both to relate to other adults and children.

Because academic education is the major goal of the program thrust, the cognitive-intellectual functions of most

of the target population presumably may be improved. Parents will be better informed about ways of dealing with their children's disabilities, and children will benefit from early stimulation of their cognitive responses. Moreover, through such a program, some mental retardation may presumably be prevented through early intervention in "cultural-familial" retardation. Similarly, some of the effects of sensory deprivation of deaf and blind children could be alleviated.

For many in the target population--primarily the deaf, the blind, and the mentally retarded--a preschool academic education program may significantly enhance the communication life function.

The mobility of members of the target population may be enhanced to the extent that the preschool academic education program may offset parent's tendencies to keep disabled children "locked up" and sheltered from exposure to the outside world. Hopefully, such children could begin to enjoy greater self-mobility and geographic mobility as a result.

AFFECTED INDIVIDUALS, GROUPS, AND ORGANIZATIONS

Other benefits deriving from early intervention aspects of the program may include a reduction in the cost of criminal programs, including penal institutions, and a reduction in the cost of institutions for the disabled. Moreover, an actual decrease in the disabled population may be effected through early identification and treatment of disabled preschoolers. Potential positive impact is also forecast for the life

functions of living and unborn siblings of the disabled children.

A further family-related benefit may result from the impact of early intervention on children of the disabled. Early diagnosis and treatment of hereditary disability may reduce the size of future disabled populations, and early diagnosis and treatment of non-hereditary disability may improve the life functions of children of persons afflicted with these types of disabilities. In addition, preschool education for the disabled almost certainly will have positive impact on the success of other educational and functional programs that these persons go through.

GROUP-DISCUSSION CONSEQUENCES

Possibly offsetting the reduction in the disabled population resulting from early intervention is an increase in numbers of disabled persons diagnosed through such a program as indicated in links 9 and 10 of figure 4-2. Overall the inability to accurately forecast developments in diagnosis and treatment technologies makes an accurate estimate of the impact of a preschool education program on the size of the disabled population virtually impossible as indicated in links 20, 25, and 29 of figure 4-2.

Very few negative impacts are noted for this program thrust, although cost (links 2, 28, 23, 24, and 27, figure 4-2) certainly constitutes a sizeable negative impact, an impact

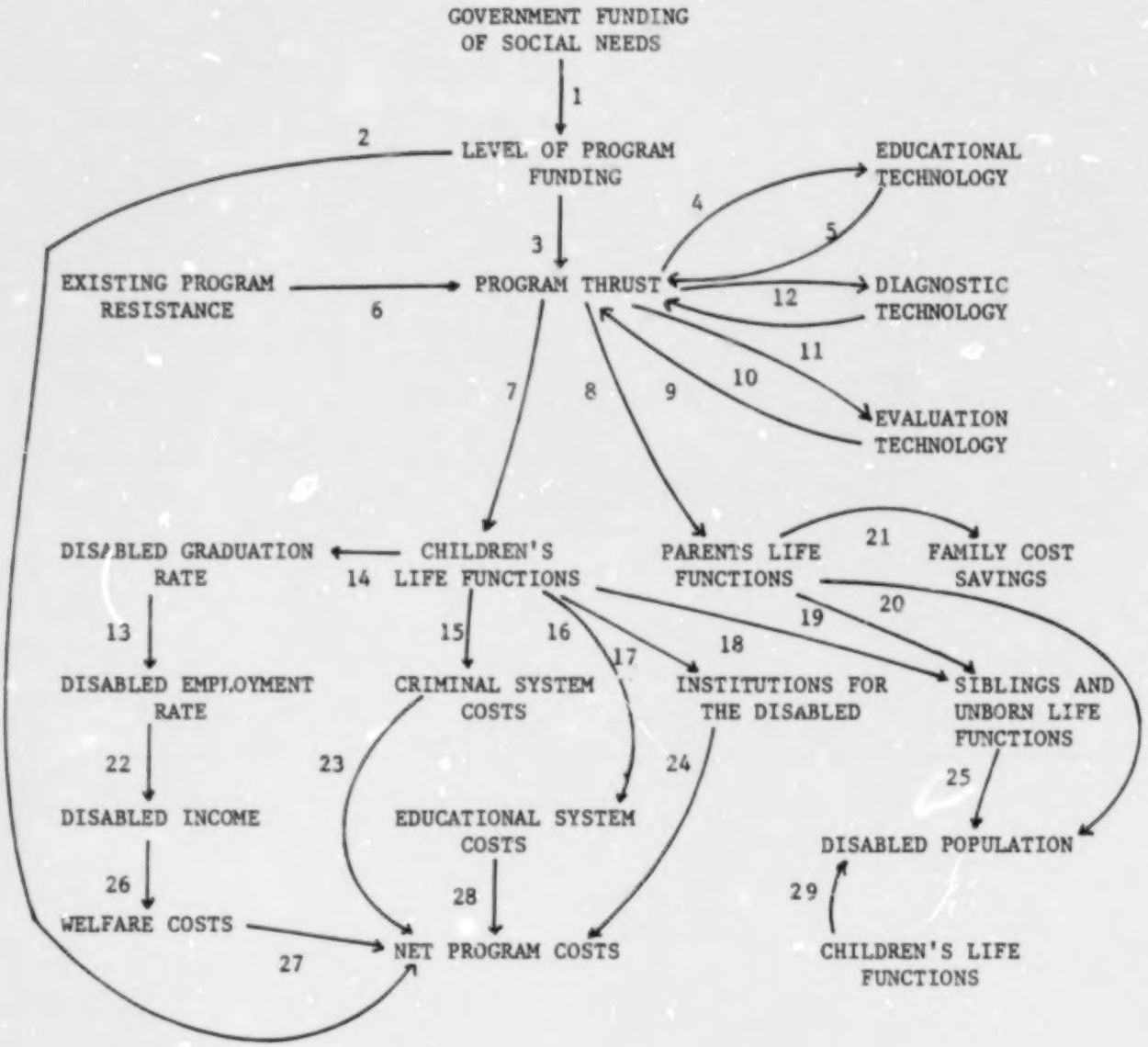


Figure 4-2. Causal diagram of hierarchical and interrelationship analysis of preschool academic education program thrust with emphasis on the ecnomics of service delivery

explored in considerable detail within the vocational-education program thrust.

HIERARCHICAL AND INTERRELATIONSHIP ANALYSIS

The results of the hierarchical and interrelationship analysis are presented in figures 4-2 and 4-3. Although both figures represent the same program thrust, the first causal diagram shown in figure 4-2 emphasizes the economics of service delivery. The second causal diagram shown in figure 4-3 emphasizes the logistics of pre-school academic education.

In addition to the group-discussion consequences identified in the diagrams, several significant aspects of the program thrust are seen in the causal diagrams. Only one feedback cycle is shown in figure 4-3. This cycle is shown in the link between *societal attitude and confidence* to *level of program funding*. Positive feedback cycles (enhancement cycles) exhibit a tendency to growth in the variables involved, while negative feedback cycles (diminution cycles) exhibit a tendency to decline in the variables involved. Feedback cycles have an important effect both on the growth of variables and in the regulation of variables within acceptable ranges of values.

COMPUTER-GENERATED CONSEQUENCES

The computer simulation indicates that the causal diagram is unrealistically optimistic about this program thrust. This result is primarily due to an absence of negative feedback cycles that would realistically balance the strong tendency for

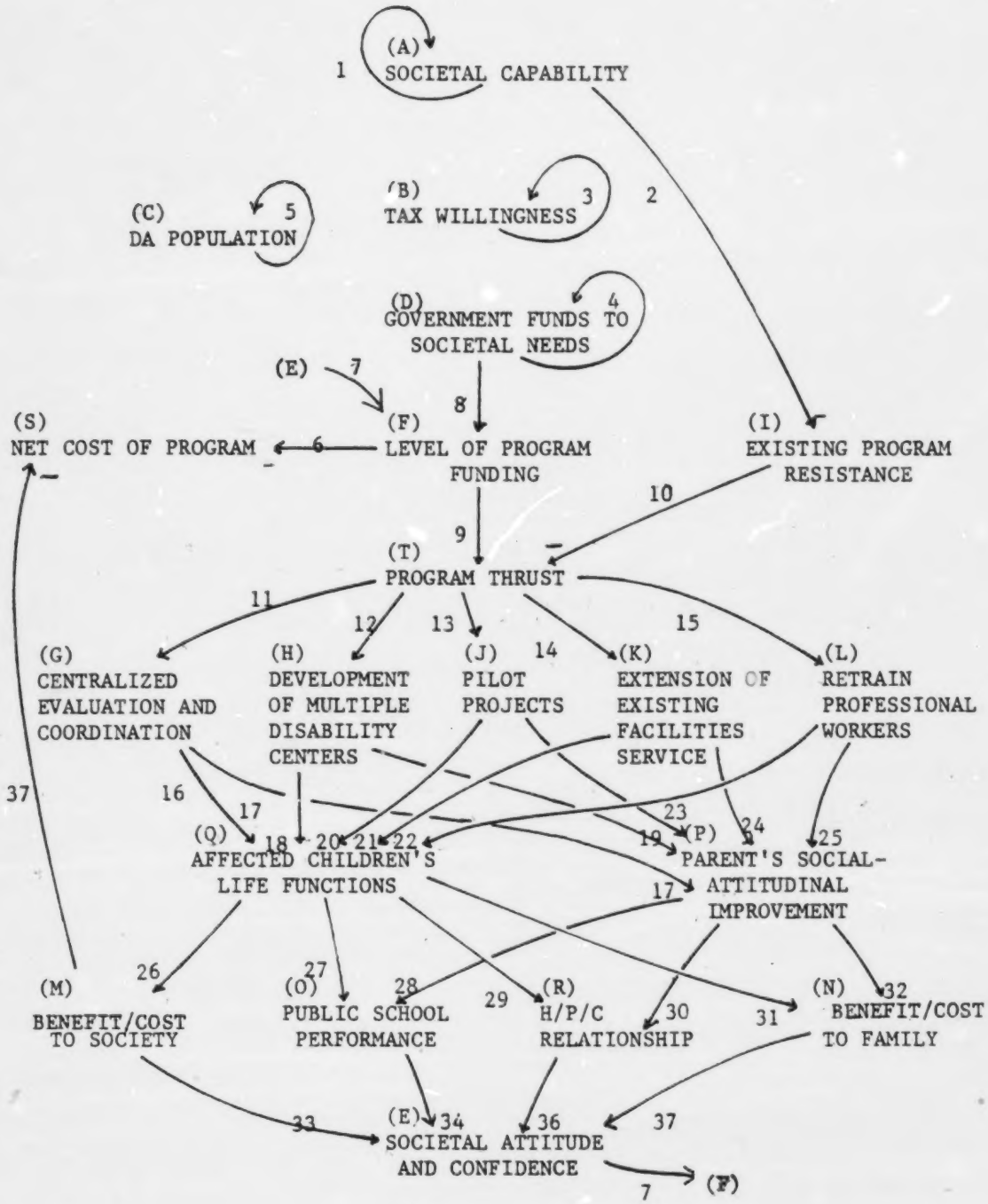


Figure 4-3. Causal diagram of hierarchical and interrelationship analysis for preschool academic education program with emphasis on logistics of service delivery

TABLE 4-1

CROSS IMPACT MATRIX FOR GSIM MODEL ASSOCIATED WITH LOGISTICAL MODEL, PRESCHOOL EDUCATION

Variable	Value	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A-Societal capability	.22	0.1																			
B-Tax willingness	.03		0.1																		
C-DA population	.12			0.1																	
D-Government funds to societal needs	.02				0.1																
E-Society attitude and confidence	.20													1.0	0.2	0.1			0.2		
F-Program thrust funding	.10				0.6	0.2															
G-Central evaluation and coordination	.10																				1.0
H-Development of multiple disability centers	.10																				1.0
I-Existing program resistance	.80	-.05																			
J-Pilot project development	.10																				1.0
K-Development of existing facilities service	.10																				1.0
L-Retraining of profession	.10																				1.0
M-Benefit/cost to society	.10																	1.0			
N-Ben./cost to families																	1.0	1.0			
O-Performance in public school	.10																1.2	1.0			
P-Parent social-attitudinal improvement	.10							0.2	0.3		0.3	0.3	0.5								
Q-Child life function improvements	.10							0.2	0.3		0.3	0.3	0.5								
R-H/P/C relationship	.10																0.5	0.5			
S-Net program costs	.10						0.2			-.5				-1.							
T-Program thrust	.30						1.0														

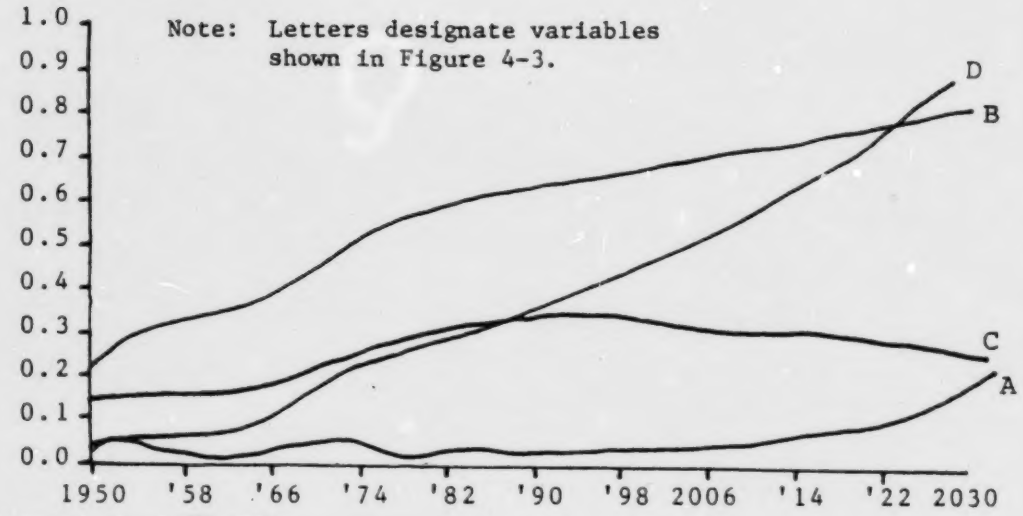


Figure 4-4. Pre-school education variable dynamics

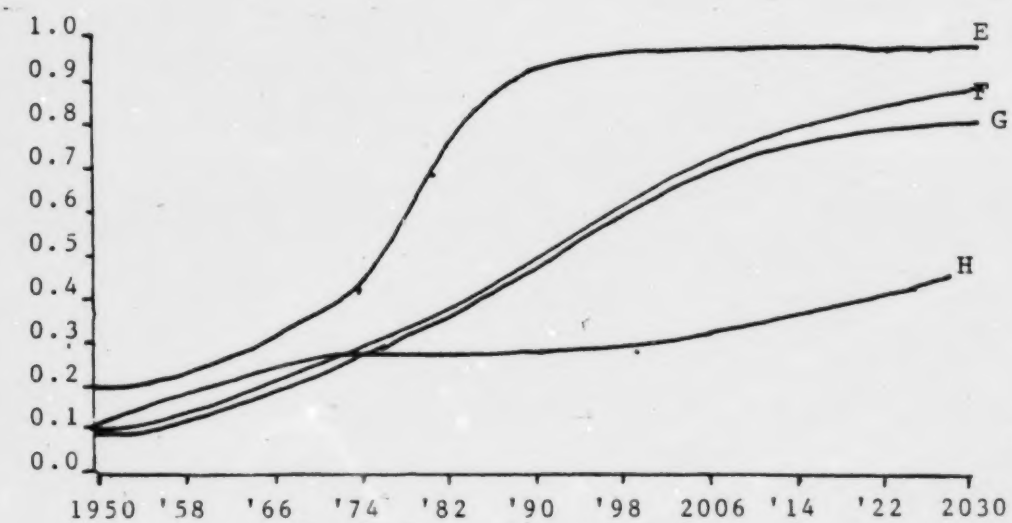


Figure 4-5. Pre-school education variable dynamics

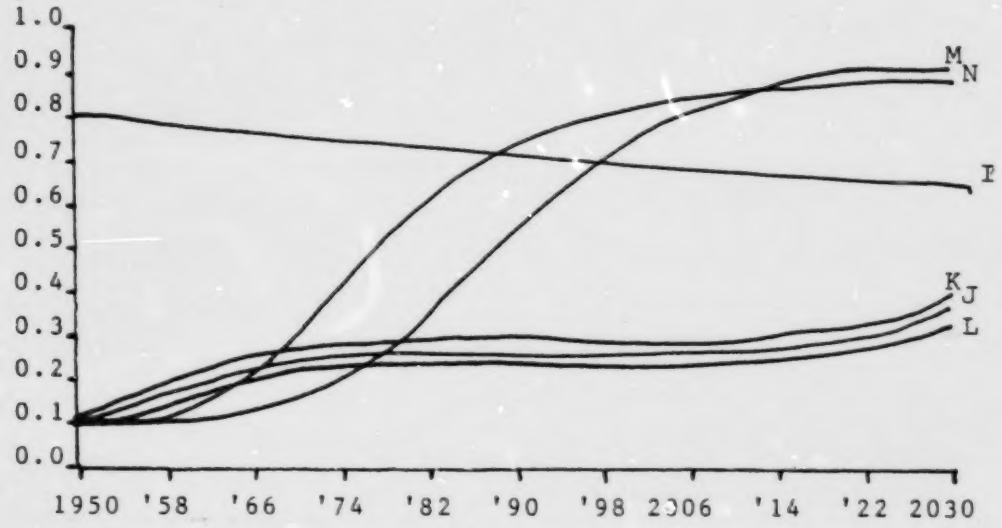


Figure 4-6. Pre-school education variable dynamics

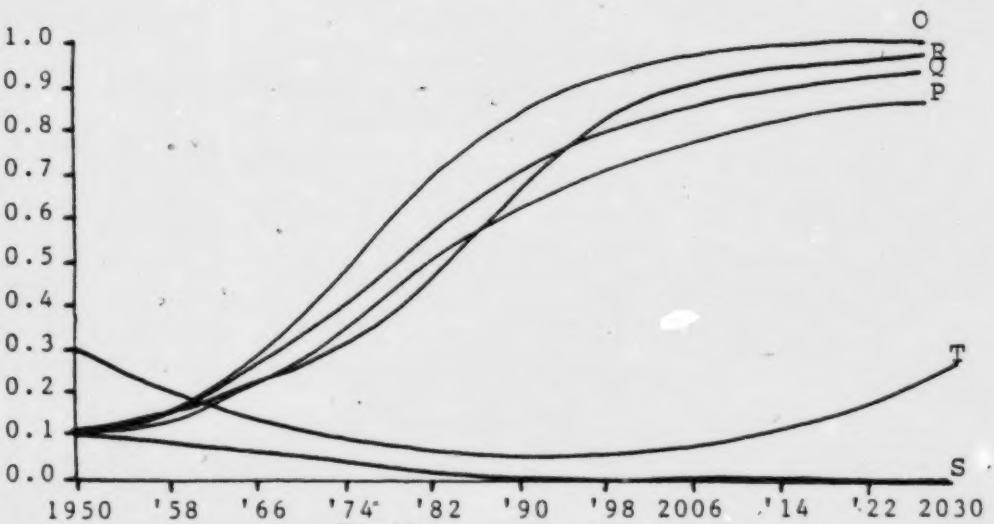


Figure 4-7. Pre-school education variable dynamics

growth in all variables. A majority of the variables including *societal attitude and confidence* (E), *benefit/cost to society* (M), *benefit/cost to families* (N), *performance in public schools* (O), *H/P/C relationship* (R), *children's life function improvement* (Q), all approach the limit of 1.0 by the year 2025. Other variables such as *net program costs* (S) decline to zero. The *program thrust* (T), declines because of existing *program resistance* (I) but recovers by 2025 as program resistance is diminished by *societal capability* (A).

POLICY CONSIDERATIONS

The benefits of a preschool education program for the disabled appear to be so great, with so few drawbacks, that a question arises as to why such a program has not already been implemented. One panelist observed that there are, in fact, efforts currently being made in the direction of preschool education programs for the disabled. Such programs are part of the greater world-wide stress on pre-elementary education for all children. This development greatly enhances the chance for acceptance of a program focusing on preschool education for the disabled. The same panelist remarked that 30 years ago, such a program would not have stood a chance of being adopted.

PROGRAM THRUST II: VOCATIONAL EDUCATION

Two factors were cited in the selection of vocational education as a particularly important program thrust: (1) the greater numbers of disabled persons who would enter school

as a result of a preschool education program for the disabled and (2) the current trend towards "mainstreaming" (the retention of disabled pupils in regular classrooms and schools). These two factors intensify the need for programs to meet the unique needs of the disabled, of whom few are able to move into society through continued academic education. The movement of the disabled through the educational system, it was felt, may result in their being equipped with some marketable skills.

The general program thrust of vocational education, is subdivided to encompass pre-vocational as well as vocational education.

DESCRIPTION OF TARGET POPULATION

Current estimates are that by 1980, 5.3 million disabled students will be included in the school population. This number then constitutes the target population.

STRATEGIES FOR ACHIEVING PROGRAM THRUSTS

The pre-vocational education program is envisioned as being centered primarily in the elementary and junior high or middle schools. Because of the unspecialized nature of the skills to be taught through this program, it is envisioned as a very inexpensive program which would make use of the present school staff with minimal retraining. Need expenditures center primarily on some orientation of teachers and on instructional materials.

ASSUMPTIONS AND AXIOMS

The projected program of vocational education for the disabled is predicated on the following assumptions and axioms.

1. All programs will be incorporated within the public school system.
2. All of the disabled population will be integrated into the public school system.
3. The program will be funded by the public with support from business and industry.
4. Some facilities presently exist for implementation, although many more will be needed.
5. The manpower needs for such a program will be substantial, particularly on the secondary-school level.
6. Industry and government will accept qualified disabled employees.
7. Persons completing the program will be capable of being integrated into the workplace without special labor laws, etc.
8. All disabled students will advance to at least a junior-high level for vocational training, if necessary through social promotion.
9. Adequate transportation to vocational-training centers must be found.
10. Types of training offered will be based on careful market research.
11. Population distribution will be a key factor in the design and implementation of the program.
12. Technologies for pre-vocational and vocational training of the severely disabled do not presently exist.
13. Productive employment is good for the individual.
14. Vocational schools and training in the U. S. are held in general disrepute by the general populace and hence have too often been neglected.

OBJECTIVES AND PERFORMANCE REQUIREMENTS

For the disabled population, the main object of vocational education should be the acquisition of a specific marketable skill in an area in which jobs are available. These jobs might be in custodial work, welding, carpentry, electronics, plumbing, or sanitation, etc. Other objectives include maximizing the self-sufficiency, economic freedom, and personal and social life-choices of disabled persons.

IMPLEMENTATION REQUIREMENTS

Implementation of such a program, however, involves many complex problems and ramifications. The key to implementation depends on the availability of government funding, particularly since the program is to be administered through the public schools. In addition to support from federal and state funding, the program can probably receive some support from local communities and from industry.

In addition to problems with funding, manpower for vocational education for the disabled is a big problem. There is a philosophical question about whether the present school staff should be retrained in vocational skills or whether vocationally trained persons should be trained so that they can function in an educational setting. If retraining of skilled persons for teaching positions is the object, then there are real problems in certification. Securing manpower in the program will require union support opportunities for apprenticeship training for the disabled.

The vocational training part of the program thrust is to be implemented in both junior high and high schools, and will require substantial changes in both staff and facilities. Consequently, start-up costs for the program are high. Moreover, because of geographic distribution of the disabled and varying resources, not all schools will have vocational training programs.

The cost of the program, both in terms of start-up and maintenance will be quite high. The group estimated that such a program will require an expenditure of $500 per pupil per year, above the costs for non-disabled students. For a target population of 2 million students, the total cost will be $1 billion. The magnitude of this figure was vividly pointed out by a panelist who observed that the income of one Texas company is about $1 billion annually. That income is produced by about 60,000 employees who, in turn, pay about $50 million in taxes. In practical terms, these figures mean that the total tax revenue of 20 companies the size of this company will be required to make up the $1 billion cost of this program.

Financing a vocational education program like this one involves a tremendous reallocation of a portion of the GNP (the monetary value of all goods and services produced in this country). With the current GNP standing at $1499 billion in 1975, the reallocation of $1 billion to finance vocational education is not very likely. The likelihood is even further diminished when the $1 billion figure is compared

to the total federal budget of $400 billion. Furthermore, one panel member pointed out that the total current expenditure for all vocational rehabilitation in this country is $1 billion. The probability that an additional $1 billion will be allocated to serve the needs of only a portion of the disabled population is not very likely. The same panel member also pointed out that programs of this type usually cannot be sold to the public on the basis of cost effectiveness alone.

LIFE-FUNCTION ANALYSIS

Implementation of an extensive program of vocational education for the disabled may have a positive effect on all life-functions of the disabled, with the greatest benefits accruing in the social-attitudinal area in terms of self-respect and motivation to join the community. Somewhat less comprehensive but still very significant gains may also be made in the areas of communication and cognitive-intellectual functioning. Mobility, in terms of ability to function within the community, may be improved, as would be health in terms of increased use of physiological and motor skills.

Among the target population, the emotionally disturbed and persons whose disabilities are related to speech and hearing can be expected to be most significantly affected by improvements in the communication life function, and all of the target population can be expected to be significantly affected by improvements in cognitive-intellectual and social-attitudinal life functions.

AFFECTED INDIVIDUALS, GROUPS, AND ORGANIZATIONS

A broad program of vocational education within the public schools will affect the general population most directly in the area of competition with the disabled for jobs. If preference for jobs is given to disdabled individuals, unemployment among the non-disabled may increase, and public resistance to vocational education of the disabled could be a real problem.

The projected vocational education program would also affect the technological community. Implementation of this program would create new jobs for professionals in all areas of training and counseling, and it would result in the creation of new technologies for the treatment and training of the traget population. In addition, the technological community may be called upon to meet the needs of the disabled in both the architectural design of schools and in the design or redesign of special tools adapted for use by disabled workers.

Several organizations may be affected by implementation of the projected vocational education program. Both public and private organizations which presently provide vocational training for the disabled may undergo either a decrease in size or a change in direction or role. The public school system may have to undergo profound changes in both administration and financing, engendering confusions which may take 5 to 10 years to resolve. Trade and craft unions may also be profoundly affected during the resolution of issues regarding acceptance of disabled workers within union ranks. The business community

would be affected to a similar extent because the success of the program would depend primarily on the business community's participation in and acceptance of the program.

Not the least of those affected by a vocational education program would be the families of the disabled. The family unit would be strengthened through a decrease in the financial burden imposed by a disabled member, and by a resultant increase in the psychological well-being of the parents and siblings of the disabled. However, offsetting such potential benefits to the family unit is the problem of anxiety over redefinition of roles when a disabled family member is returned home to earn a living for himself.

GROUP-DISCUSSION CONSEQUENCES

The greatest benefit of the vocational education program may be an increase in productivity potential. As shown in link 15, figure 4-9, this program will increase employability among the disabled. This program will increase the output of goods and services by the disabled. Moreover, most of the disabled in the vocational education program will be trained for blue collar positions, and will find a favorable job market because of general societal resistance to entering blue-collar vocations.

HIERARCHICAL AND INTERRELATIONSHIP ANALYSIS

The hierarchical and interrelationship analysis of the vocational education program thrust is illustrated in the causal diagram shown in figure 4-9.

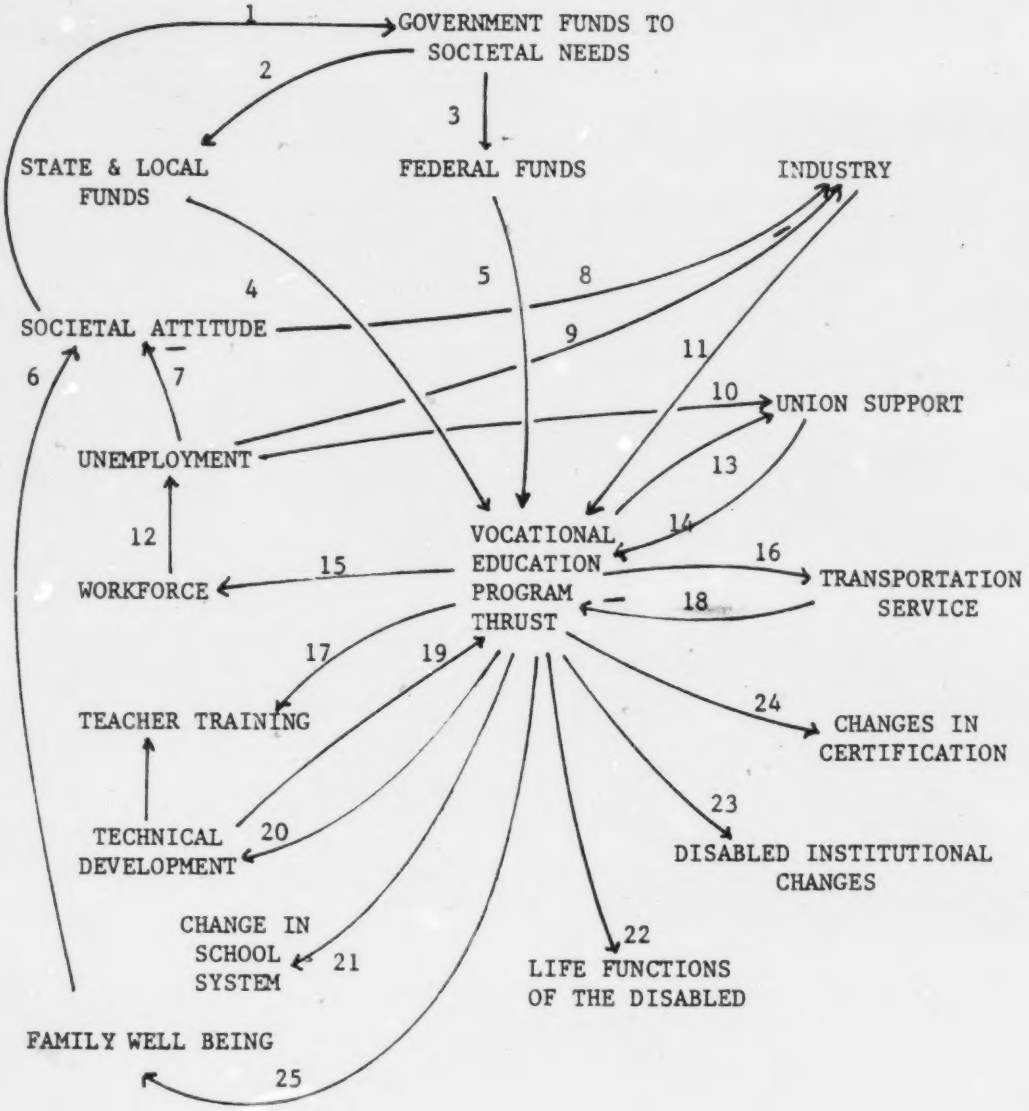


Figure 4-9. Causal diagram of hierarchical and interrelationship analysis of vocational education program thrust

As in figure 4-3, the causal diagram in figure 4-9 indicates a noticeable lack of counterbalancing feedback cycles. Most influences cause growth in the variables until some outside factor constrains further growth. No attempt was made to implement a GSIM model based on this causal diagram because the dynamics exhibited by these variables and couplings are nearly identical to those of the previous program thrust.

POLICY CONSIDERATIONS

The proposed vocational education program would be a cost-effective program. Statistics from the GAO show that even current vocational rehabilitation programs are cost-effective. Nonetheless, cost-effectiveness is evident only on a long-term basis, and there is a reluctance to fund programs with delayed benefits. Panel members generally agree that cost-effectiveness is seldom a significant criterion in allocation of federal dollars. Therefore, the panelists seriously doubt that this program of vocational education can be put through.

If an attempt were made to put through this vocational education program, one of the major obstacles to be overcome would be public resistance. The degree of resistance depends largely on the unemployment rate. As long as that rate remains at about 4 percent, little public resistance may be encountered. At 6 percent unemployment, moderate public resistance may be encountered, and at 8 percent or above strong public resistance is probable. In an unfavorable

job market, the non-disabled may particularly resent disabled workers holding jobs and receiving special training for them at taxpayers' expense.

The capability or willingness of the public to reallocate large sums of current tax resources or to increase the tax load in support of any program for the disabled is highly unlikely.

CHAPTER 5
SERVICE DELIVERY WORK-SESSION PANEL

The rehabilitation service-delivery system comprises the management, content, and resource requirements involved in all three specialized branches of technology: environmental change, physical intervention and training and counseling, as shown in figure 5-1. The broad applications of service-delivery place the program thrusts of this system in a central position within the general system considered. The group represented this characteristic of the service-delivery program by the general system concept illustrated in figure 5-2.

The general system concept was simply to attach to a particular disability problem a specific set of concerns and embed all in a complete set of related issues. The specific set of concerns was identified as the societal variables, aspects of a particular disability problem, aspects of the program thrusts, the planned intervention in the disability problem and some set of consequences. The service-delivery system group began with this kind of notion and used this rough picture as a manner of organizing as it went through the work sessions. Only one program thrust was examined by the service-delivery system group.

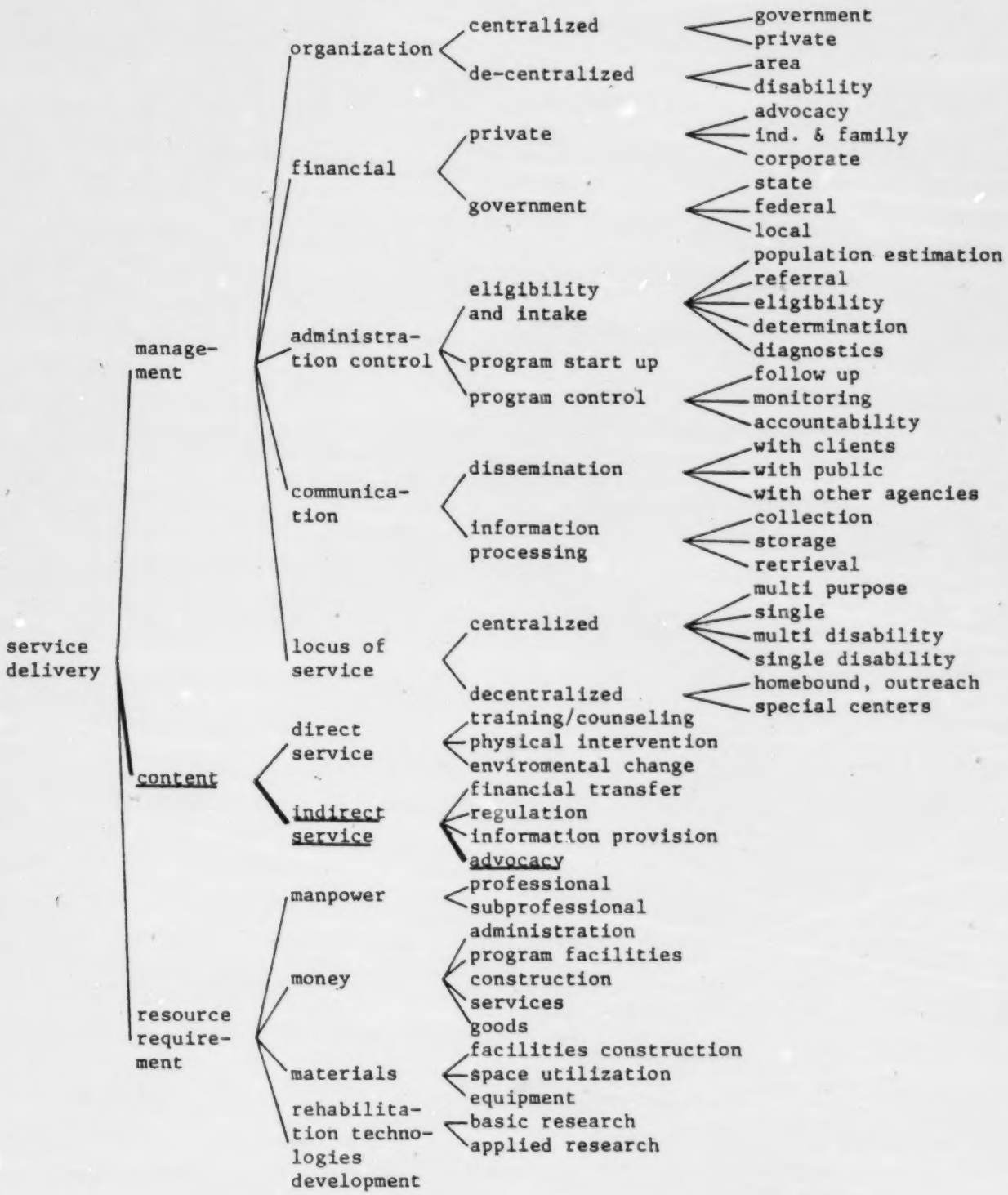


Figure 5-1. Tree diagram: technology levels for service delivery.

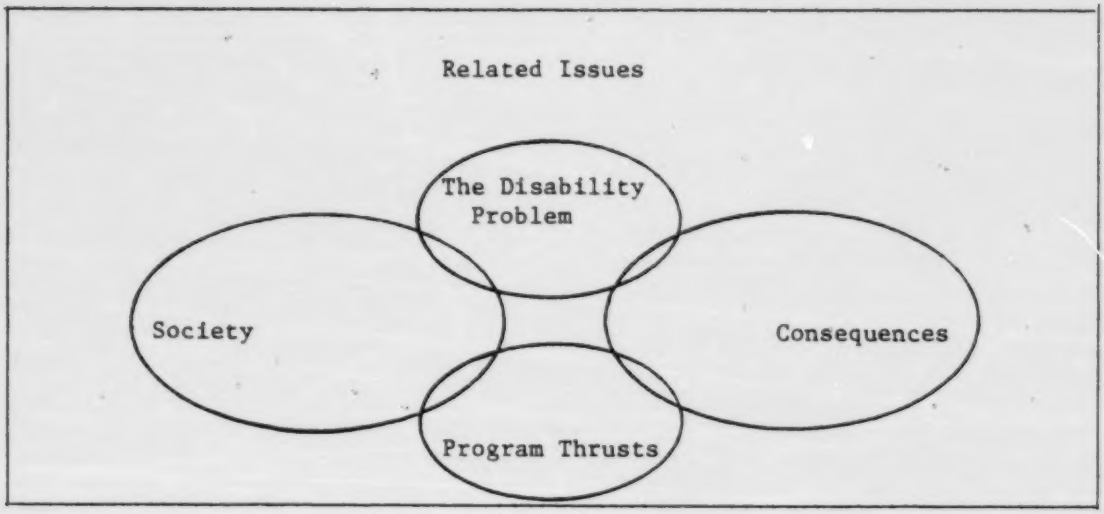


Figure 5-2. General system concept related to a particular disability problem

PROGRAM THRUST

The program thrust that the service-delivery system group originally attempted to examine was transfer payments inside of a service-delivery category called indirect services. After a considerable amount of discussion and a first pass through the whole methodology, using the transfer payments as a thrust, the group identified "advocacy" as the program thrust and further examined specific organizational and institutional strategies for advocacy. In this sense, an "advocate system" is a technology, application of which affects the efficiency, adequacy, and effectiveness of transfer payment indirect-aid approach as well as the direct services of other technologies. This change from the original service-delivery system tree diagram of figure 5-1 was shown by the tree diagram in figure 5-3.

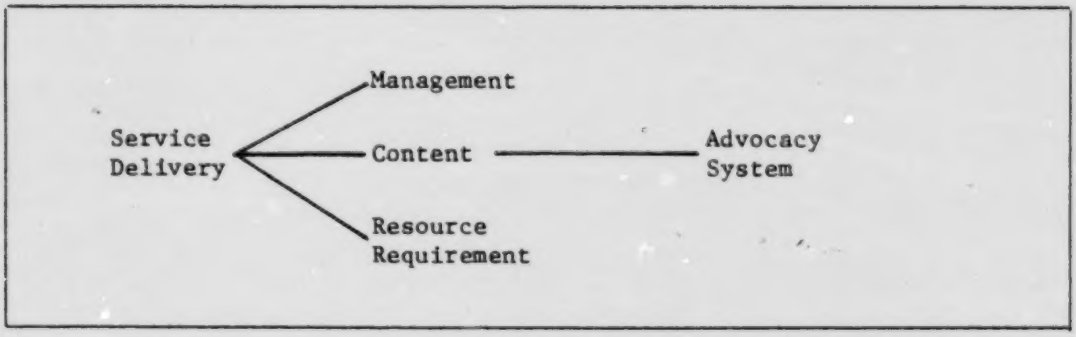


Figure 5-3. Partial tree diagram pertaining to the technology levels for service-delivery.

The overall notion of advocacy, a term used among legislators, rehabilitation institutions, and other agencies, includes representing the interest of others; in this particular sense, advocacy indicates the representation of persons or groups who are unable to help themselves. Advocacy encompasses the following areas.

Legal Advocacy: ensuring that legal rights are represented without discrimination.

Policy Advocacy: ensuring that the interests of selected persons are represented in policymaking, as in lobbying.

Public Advocacy: ensuring the education of the public through public-awareness programs.

Citizen Advocacy: ensuring that the private citizens who volunteer their services are represented as benefactors.

System or Case Advocacy: ensuring the interests of groups of the chartered public, as in brokering.

Self Advocacy: assuring the interests of the voluntary organizations of the disabled.

Regardless of form, advocacy is used to (a) monitor client and service-delivery system interactions, (b) to represent the interests of clients in instances of disservice, lack of service, or excessive service, and (c) to advocate policy changes as necessary for the system or clients.

DESCRIPTION OF TARGET POPULATION

The target population consist of the disabled population without respect to the extent to which they are now--or have been--served.

STRATEGIES FOR ACHIEVING PROGRAM THRUST

Among the strategies considered for achieving the program thrust is litigation, which holds little promise because of consideration of one case at a time. Litigation is, however, useful for securing individual rights and setting precedents. Citizen advocacy can be quite useful in providing the means for one-to-one or individual representation used to recruit, train, or designate help in support of the disabled. Self-advocacy may be useful, and it may be manifest in economic contributions (such as payroll taxes, insurance-premium payments, and income-maintenance payments) as well as in more overt forms.

In general, all of these strategies can be divided into two categories. Case advocacy and policy advocacy belong in a category in which the main object is making the current delivery system work. Legal advocacy, citizen advocacy, and self advocacy belong in a category in which the main object is providing service when the current system fails to deliver services; these strategies emphasize change of the system so that the services will be delivered.

ASSUMPTIONS AND AXIOMS

The following assumptions or axioms are considered to be inherent in assessing the advocacy program thrust.

1. Transfer payments for the disabled will increase in number and scope, or they will increase in number or scope as time goes by.

2. Transfer payments might not be a successful form of service delivery unless they are linked to some advocacy system in order to ensure accountability of the needs of the disabled.

3. Disabled individuals have rights which are not now being recognized, and some disability-related laws are not being enforced.

4. Greater public awareness will bring greater response to the needs of disabled individuals, groups, or individuals and groups.

5. Support for advocacy programs must come from either public (including governmental) sources, private (including charity) sources, or both.

6. The more money devoted to advocacy programs, the better the programs are likely to be.

7. The disabled are not always aware of available services.

8. The disabled prefer environments as similar as possible to those of the non-disabled.

9. Socioeconomic variables (in scenarios) can be specified.

10. Transfer payments can reduce the need for organized delivery of direct services.

11. Individuals can be held responsible and accountable for assessing their own needs.

12. Market imperfections can be corrected by legislation and other means.

13. Criteria for poverty can be realistically set.

14. National health insurance may be imperfect.

15. Large bureacracies have difficulty providing quality service delivery.

16. Services can handicap, as well as help, the disabled.

17. Advocacy is a necessary condition for the delivery of quality human service.

18. Advocacy resources differ with advocacy goals and activities.

19. Advocacy can work within the system.

20. Advocacy works best when it engenders cooperation from inside and outside the system.

21. All disabled persons sometimes require an advocate.

22. Professional and administrative support is necessary for advocacy to work inside the system.

23. Advocacy offers a practical accountability mechanism in service delivery.

OBJECTIVES AND PERFORMANCE REQUIREMENTS

Advocacy is required for providing overall stability in the system-client environment. It provides a "monitoring" or accountability function that collects and communicates information about system functioning. Such information is required for the proper working of the service-delivery system and for the well-served client. The system is ensured continunity, and the clientele is assured the actual delivery of beneficial services.

Economically, advocacy provides for income redistribution and maintenance, and in general it provides for a basic level of economic self-sufficiency or societal sufficiency. It can reduce the number of disabled persons in the poverty category. It can reduce the overhead involved in a service-delivery system having less-efficient communication, and it can also improve the acceptability of the service-delivery system to disabled clients by providing more effective transfer payments and more efficient communications about needs. Efficiency in the system can be achieved by the advocacy system through the permeation of general knowledge about service duplication and excessive service.

Socially, advocacy can promote decentralization and deinstitutionalization. It can significantly reduce the amount of litigation required to secure services, as well as the litigation required for enforcement of relevant laws. More effectively than the courts can, advocacy can measure

delays in service delivery and keep accounts of clients not served. An advocacy system structurally promotes the socioeconomic status of disabled clients to be the same as that of the nondisabled population maximizing self-sufficiency on the part of the disabled and responsiveness on the part of the nondisabled.

Logistically, an advocacy system promotes accountability within the service-delivery system by providing bidirectional communication among delivery systems and clientele, increasing clients' knowledge of rights and services, and providing representation for clients whose interest are underserved, overserved, or in jeopardy. Advocacy facilitates development of adequate representation of the clientele within the private sector of society by upgrading client participation in public processes and policymaking. Overall, advocacy can maximize client participation in decisions about the nature, location, form, and quality of services provided.

IMPLEMENTATION REQUIREMENTS

An advocacy system requires economic resources through which the clientele and the public are either contributory, noncontributory, or both. Funds may be obtained from either public or private sources.

Advocacy requires a firm data base for implementation, and this requirement necessitates reliable information on policy development and methods of influencing policy development.

Research knowledge must be collected on the efficacy and efficiency of current advocacy systems. Resource personnel, as part of the advocacy system, must adequately contribute knowledge about system administration and management, facilities, staffing and manpower, and supportive technologies. Advocacy management must be able to secure financial resources from federal, state, local, and private sources.

LIFE-FUNCTION ANALYSIS

Advocacy may provide improvement throughout the entire spectrum of life-function needs for the disabled. It may increase mobility. Health may be improved through provision for communication to improve the quality of human health services. Communications functions will improve directly, providing for much more real-time delivery of services necessary for the disabled and providing increased communications-related social mobility for the disabled among themselves and the nondisabled public. Cognitive-intellectual life functions may be improved through better conceptualization of rights and services either available or potentially available. Social-attitudinal improvement resulting from advocacy can result in individuals maintaining increased feeling of self-worth, although envy among those clients whose interests are curtailed or unaffected by the advocacy system (as, for example, veterans) might degrade social-attitudinal functioning.

Specific types of advocacy primarily affect specific life functions. Legal advacocy will affect mobility, social-

attitudinal functions, and communications. System advocacy will influence health and communication. Social-attitudinal functions will receive primary benefit from citizen advocacy and self-advocacy, although self-advocacy will provide additional primary benefit in communication life functioning. Policy advocacy will primarily affect health and communication life functions. All five types of advocacy can result in improvement of selective life functions, although all five may adversely affect the social-attitudinal functioning of disabled individuals, groups, and organizations now otherwise served.

AFFECTED INDIVIDUALS, GROUPS, AND ORGANIZATIONS

Advocacy primarily affects the general population, the technological community, already-established organizations, and the families of disabled persons.

The primary effect of advocacy upon the general population is increased communication. This increased communication may result in discomfort to members of the general population in the initial stages of advocacy because of non-disabled individuals' being unaccustomed to social interaction with the disabled, but alteration of such "custom" over time may very well lead to greater overall social satisfaction. Nondisabled members of the general population will become more aware of citizens with disabilities, and thus nondisabled citizens may by individual choice volunteer to become citizen advocates.

Initially at least, advocacy may place an additional financial burden on the general population, although over time--if funding is used with discretion--advocacy may cost less than current disparate delivery systems. Advocacy system funds may be balanced by funds unspent in duplication of services, unnecessary service, and unnecessary administrative overhead.

During periods of increased financial burden upon the general population--through transfer payments as well as through direct services such as private insurance, public welfare, and the like--disposable income will be reduced. Personal saving activities may be expected to diminish, and thus social, economic, and political (including legislative) effects must be anticipated.

The technological community will benefit from advocacy, primarily because of increased demand for services stimulated by increasingly effective communications.

Improved products and services will be required by a better-informed clientele, and such demands may be intensified by the formation of consumer groups representing the disabled. Advocacy will result in restructured labor-and-marketplace dynamics, as in, for example, a higher rate of removal of architectural barriers and a response in legal practices to the requirements of an advocacy system. Any loss of the technological community caused by a reduction in direct

services financed by transfer payments may be counterbalanced by expansion of the community within areas such as social work. Competition among vendors may contribute to fluctuation in employment dynamics as competition increases. In telecommunications, for example, manufacturers may be expected to expedite development of television for the hard-of-hearing, while advertising technologists may certainly be expected to attempt to capitalize on influence by the advocacy system by aiming advertisements at disabled individuals, groups, and organizations.

Overall, change and perhaps growth in the technological community will be stimulated as the community moves toward increased productivity to meet recently surfacing needs with new applications of technology.

Organizations may be affected from the communication-forced restructuring of the service-delivery system brought about by advocacy. This restructuring will be manifest on federal, state, local, and private levels.

The basis of communication-forced restructuring lies in the advocacy-focused organization of the disabled. Tighter organization of the disabled among themselves and better communication with the general population may place heavy demands upon present institutions to share responsibilities for providing the disabled with services, and the organizations may no longer be able to operate with current autonomy. Public monitoring of public and private services for the disabled may result from increased public awareness, adding additional

impetus to a tighter restructuring of organizations.

A dynamic interaction among private and public institutions is certain. Economics may significantly alter the magnitude of private donations to charities, and the resulting demand voiced by charities for private rehabilitation facilities will change correspondingly.

The advocacy-service organization may be expected to reinforce itself with the generation of new component organizations, most likely with the sanction of the public and perhaps at the insistence of the public. Resources for the use of the advocacy organizations may be expected to increase with a growing effect of advocacy upon the public.

The overall effect of the advocacy system on organizations will be to place new demands for tighter operation within and cooperation among present organizations and the establishment and enhancement of the advocacy organization itself. Like other affected groups, families of disabled individuals may expect overall benefits from an advocacy system of service delivery, and most benefits will center around strengthening the family unit.

Services traditionally performed by the family may be expected to place less burden on family dynamics as a result of increased support from outside the unit. Advocacy-initiated financial transfers may provide the family with still further resources to alter priorities in living, providing more time for family activities and altering family customs in service and product consumption. Because of

personal autonomy afforded disabled individuals as a result of their being raised above the poverty level and provided with services independent of the family, the disabled individual can better function as a sustaining element within a family. (Family "projects" can seldom be family "members.")

But the same autonomy which may aid the family of the disabled may also hinder it. Disabled persons unaccustomed to such activities as family decision-making may hinder the process or cause resentment among family decision-makers whose functions are diminished. Also, as a result of the expectations engendered within the disabled by the communication effects of advocacy, families may not be able to satisfy the unaccustomed needs of the autonomous disabled, thus forcing the family into potentially serious conflict.

GROUP-DISCUSSION CONSEQUENCES

The consequences of an advocacy system of service delivery depend primarily on two factors: (1) the capacity of advocacy to produce changes in organizations and procedures, and (2) the capacity of advocacy to maintain an up-to-date review of both direct and indirect service-delivery systems.

Among the specific consequences which may be predicted are the following:

1. Advocacy may result in major policy reform.
2. Advocacy may result in deinstitutionalization of a significant segment of the disabled population.
3. Advocacy may result in institutional change, such as the retraining of personnel within rehabilitation institutions and reduction in staff size because of deinstitutionalization of clients and recruitment

of personnel for the advocacy system from among institutional personnel

4. Advocacy may result in a disabled population which is more visible to the general public.

5. Advocacy may enable more disabled persons to become employed.

6. Advocacy may result in market uncertainties and imperfections caused by the inadequacy of present knowledge about market potentials integral to the advocacy system.

HIERARCHICAL AND INTERRELATIONSHIP ANALYSIS

The hierarchical and interrelationship analysis of the service-delivery program thrust on advocacy is shown in figure 5-4.

Three general levels of hierarchy are characterized by the model of the advocacy program thrust in figure 5-1. They are mainly the input and policy level, disability system level, and the outcome level. In addition to the variables belonging to each level, taxes and private fund variables can be considered as related issue variables and are included within the disability system level.

Although the model delineates some of the assumptions, objectives, performance requirements, implementation requirements, life function analysis, affected organizations, and consequences through its variables and linkages among its variables, it is at a more aggregated level than the descriptions given by other panels. Its advantage is to enable the reader to view the advocacy program thrust--its implications and consequences--as an abstract whole.

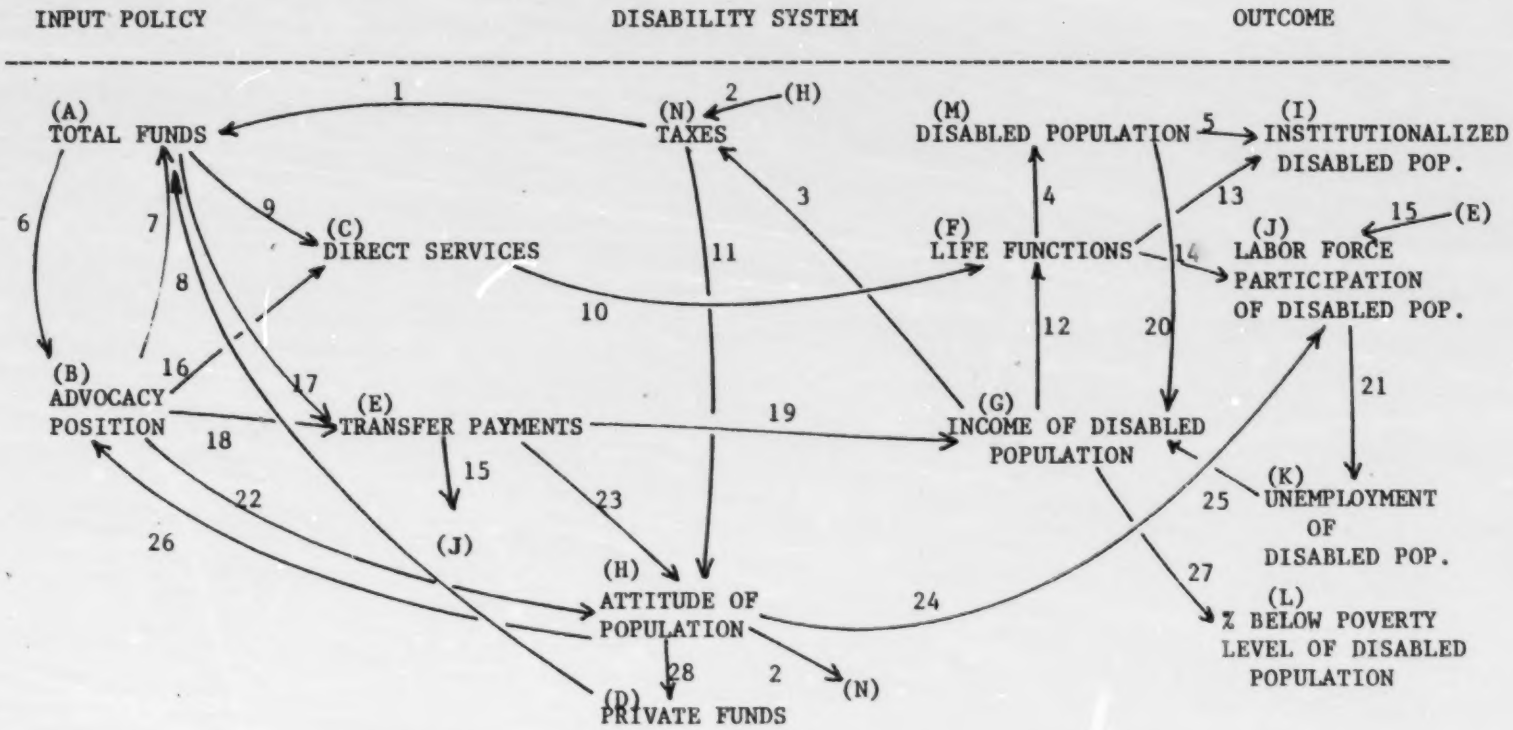


Figure 5-4. Hierarchical and interrelationship analysis of service delivery by advocacy.

TABLE 5-1
INTERACTION MATRIX AND INITIAL VALUES FOR ADVOCACY
POSITION PROGRAM THRUST MODEL

Variable	Value	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
A-Total fund available	.10		0.1		0.2										0.2						
B-Advocacy position	.10	0.2							0.1												
C-Direct services	.40	0.2	0.1																		
D-Private funds	.40								0.5												
E-Trans payments	.30	0.1	0.2																		
F-Life functions	.50			0.3				0.2													
G-Income of disabled population	.10					.95						-.3		-.1							
H-Attitude of people	.50		0.8			-.2									-35						
I-Institutionalization	.50						-0.3							0.7							
J-Labor force participation	.30					0.4	0.2		0.1												
K-Unemployment rate of disabled population	.70										0.2										
L-Percentage disabled population below poverty	.20							-.5													
M-Disabled population	.40						-.1														
N-Taxes	.30							0.4	0.2												
	.00																				

The model in figure 5-4 was assumed to operate for any disability group and for a particular advocacy system so that the details of the model would be replicated for other groups and systems and the input values would be adjusted for different combinations of target groups and proposed programs.

For the input and policy level of the model, the key input variable was identified as total funds and the policy or the intervention was the advocacy position. At the disability system level, direct services and transfer payments to the disabled population as well as income and life functions of the disabled were considered to be important. The attitude of population at large, taxes and private funds were also included at the disability system level. The kinds of outcomes in the model included the extent of institutionalization, labor force participation of disabled, unemployment rate of disabled and the percentage of disabled population below the poverty level of society.

In considering the major interactions within the model, the bulk of funds are currently directed toward services (medical services, medical transfer payments, etc.) and these were perceived as directly influencing life functions. Improvements in life functions in turn reduce institutionalization and enhance the labor force participation of disabled which would lower the unemployment rates. The transfer payments which were perceived as enhancing income of the disabled would pro-

vide an indirect assist to life functions and therefore also improve the potential for employment of disabled. The negative effects of transfer payments on the attitude of population (link 23, figure 5-4) as well as on labor force participation of disabled was also deemed important to the model.

An important substructure within the model is the tight loop between advocacy and total funds. The intervention policies would explore the extent to which advocacy is funded. One policy would be the particular percentage or proportion of funds that are directed toward direct services as opposed to transfer payments. Another would be the particular proportion of advocacy activities that were directed toward services as opposed to transfer payments. Another would be the particular porportion of advocacy activities that were directed toward services as opposed to transfer payments and in addition to attitudes of the population.

There are some complex patterns that can be perceived within the model structure. One notion was that taxes were actually the source of funds and in fact, some of the activities that were being conducted had implications that tax funds increase if the income of disabled were increased (link 3, figure 5-4). On the other hand, as taxes increase, the attitude of the population at large might be influenced in a negative fashion. The effect of the attitude of the population at large would influence the rate or extent to which private funds would be pumped into the system. In

other words, an attempt to increase the total funds through an increase in taxes might actually decrease the total funds due to the negative loop including taxes, attitude of population, private funds and total funds.

COMPUTER GENERATED CONSEQUENCES

Using the hierarchical and interrelationship analysis just discussed, GSIM was used to extract the behavioral consequences of the advocacy position program thrust. The interaction matrix giving the degree of strength of interactions among model variables and the initial value of each variable used by the GSIM is given in table 5-1. The plotted GSIM outputs for the model behavior is depicted in figures 5-5 through 5-7. The plot characters used in these figures are defined in table 5-1.

Results under the advocacy position corresponding to the Scenario I can be summarized as follows:

- Funds and services to the disabled population increases steadily following the historical trend (figure 5-5). This is due to the assumption that advocacy position will keep on increasing at a steady rate.
- Disabled population decreases gradually due to increase in their life function and also by their increased participation in the workforce (figure 5-7).
- Coupled with the increased income and total funds available, percentage of disabled population below poverty level diminishes with time (figure 5-6). The decrease is also due to the decrease in the unemployment rate of disabled population in time.
- Labor force participation of the disabled population gradually increases with time up to year 2022, then it

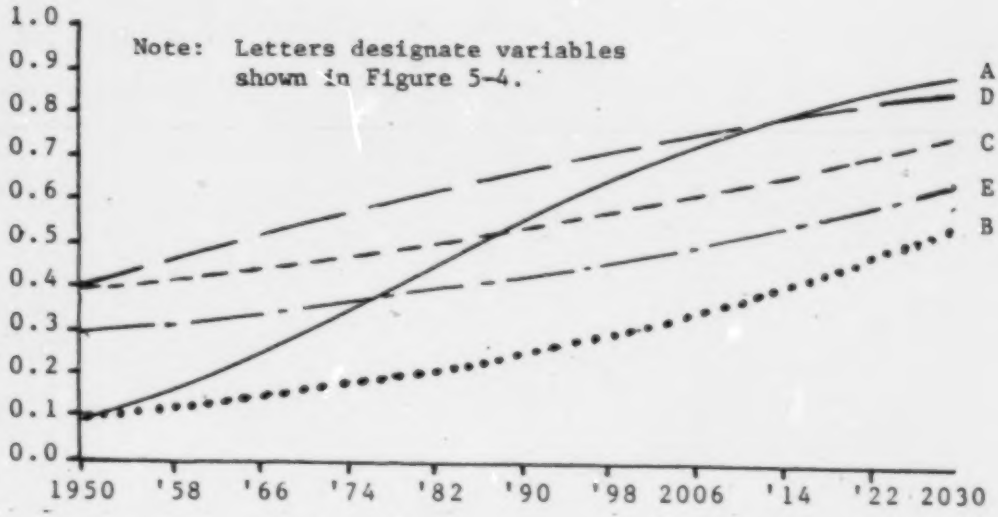


Figure 5-5. Advocacy position under scenarios I and II

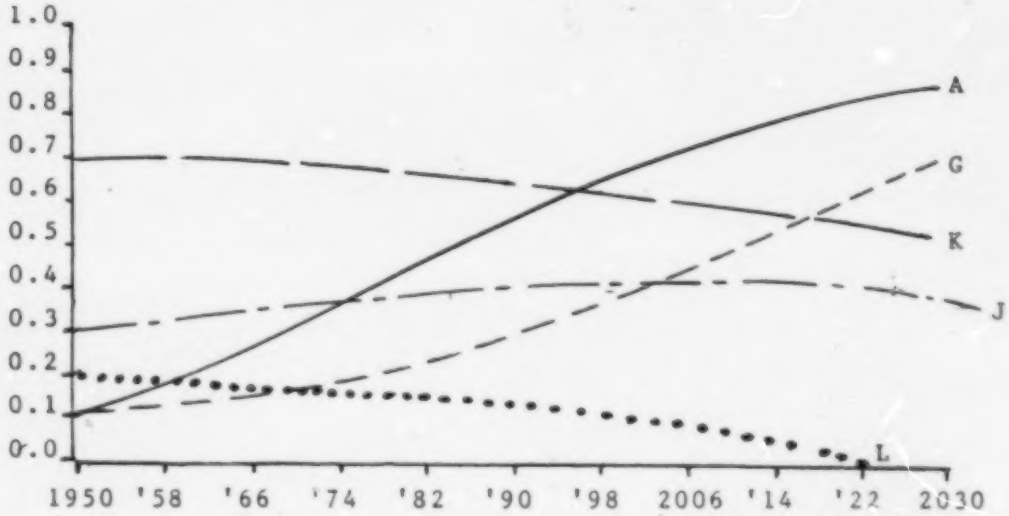


Figure 5-6. Advocacy position under scenarios I and II

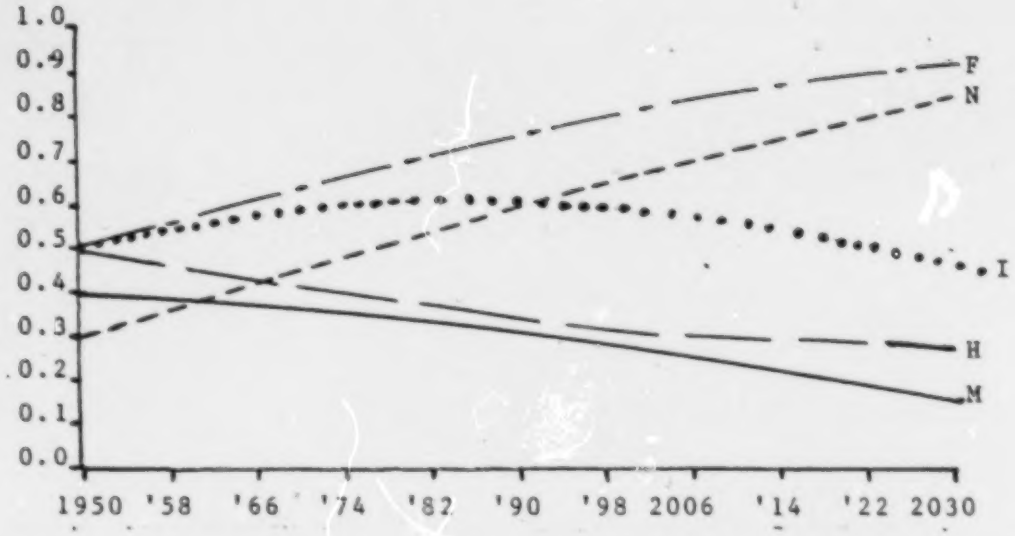


Figure 5-7. Advocacy position under scenarios I and II

starts decreasing (figure 5-6). This may be explained by the decrease of the attitude of population in general to a critical low level by that time (figure 5-7).

- Attitude of people in general decreases with time as the burden of taxes on public increases but towards the end of the time span considered it almost stabilizes (figure 5-7).

- Increase in life functions in time is a result of the increase in funds and services to the disabled population (figure 5-5 and figure 5-7).

- Number of institutionalized disabled population increases gradually until the year 1980 and then starts decreasing at a moderate rate (figure 5-7). This may be explain ' as an effect of a broader recognition of the disabled population initially followed by the effect of improved life functions to the disabled.

POLICY CONSIDERATIONS

The major policy considerations in the development of an advocacy system involve (1) the relationship of the advocacy system to existing social welfare programs, (2) accountability, (3) financial and administrative responsibility, and (4) staffing.

Whatever type of advocacy system is developed, it should be as compatible as possible with other social services currently implemented or under development. One possibility for start-up of such a program is the use of information services currently implemented or under development to effect referral services at the local level. An advocacy system should also be based on careful "market analysis" and should incorporate adequate accountability measures to ensure that it meets the needs and protects the rights of the individuals it is designed to serve.

Initial funding for an advocacy system will almost certainly have to come from the federal government. However, long-term financial support and administration of the system should be the responsibility of state and local governments. Additionally, private involvement in the system may be encouraged through tax incentives and federal start-up funds. As with many "new federalism" programs, a predicatble problem with such a funding arrangement is accountability in the spending of federal money.

The staff of an advocacy system will probably include both professionals and paraprofessionals. Professional staff members will need extensive and costly training, and the expense of this training will be justifiable only in the context of a long-term commitment to the advocacy system. Paraprofessional staff members will need only minimal training and can probably be recruited at a moderate cost from the ranks of retirees, volunteers, and other such persons. Other paraprofessional staff members such as students and housewives may be hired on a short-term or part-time basis.

CHAPTER 6
WORK SESSION EVALUATIONS

Validation of work-session results is of various forms. The most important form of validation is the extent to which the results prove useful in supporting informed policymaking. This type of validation, however, takes considerable time, and it only begins after the project has been completed and the final report in which the results appear is published.

Another approximation toward validation of the work-session results by usefulness lies in evaluation of results by experts who are thoroughly familiar with the logic of work-session subject matter. This project includes review steps which are designed to provide such evaluation.

A third approach to validation lies in critical evaluation of the process through which results have been derived. Work-session participants were asked to provide such an evaluation in the form of responses to a questionnaire constructed around work-session dynamics and achievements. This section presents a summary of the responses and some observations about the responses.

QUESTIONNAIRE DESIGN

Questions on this instrument have been adapted from questions heretofore used successfully in the evaluation of

management seminars and industrial-training courses. These are seminars and courses in which group interaction is essential, just as it is essential in the technology-assessment work sessions.

The twelve questions used in the questionnaire are divided among three measurement areas. Questions 1 through 7 measure responses in the areas of group participation and group dynamics. Questions 8 through 11 measure problem-solving and communication factors. Question 12, in seven parts, measure responses to the methodology used in the work sessions.

QUESTIONS AND RESPONSES

The following is a summary of work session panelists responses to each item in the questionnaire. Responses are listed both for members of each panel and the work session as a whole.

ANALYSIS OF RESPONSES

Responses to questions 1 through 7 indicate that most panelists were satisfied with the performance of their groups. Differences in responses to this group of questions may be accounted for by (a) differences in subject-matter considered by each group, (b) differences in personality and performance among group members, and (c) differences among group leaders.

The subject-matter considered by the work sessions varied from panel to panel. The service-delivery system panel, for example, considered material which was extremely complex, very

abstract and somewhat ambiguous, while the environmental-change panel considered material which was much more concrete and specific.

Personality-based interactions entered into group dynamics and questionnaire responses. Members were selected in accordance with their being experts in particular subject-matter areas, and they may have been somewhat uncomfortable in the small-group interactions that the work-session panels required of them. Members were trained in the rigorous methodology of science and technology, a methodology particularly adaptable to contemplation and written-work and often times not easily adapted to group conversation.

Group leaders varied in disposition and leadership methods. The satisfaction of members with panel performance may many times have been a product of varying leadership ability, especially during such times as when analysis bogged down or became stalemated.

Overall, responses to questions 1 through 7 demonstrate that work-session members were satisfied with panel accomplishments. Panelists felt that overall panel performance was good, that panel goals were moderately clear. They also felt that they had made progress toward achieving their goals while keeping discussion down-to-earth and practical. Panelists felt that they had indeed worked effectively as a group simultaneously with their carefully considering minority and individual viewpoints.

In the areas of problem solving and communication, most panelists responded that they had no strong need to depend on group leaders. They felt that the communication within each group was of good quality, and they considered the overall level of problem-solving ability of each group to be competent. Responses to question 11, for example, indicate that panel decisions represented consensus views in which majority viewpoints had been appropriately influenced by minority viewpoints.

In the area of methodology evaluation (question 12), most panelists believed that the methodological structure of the work session was helpful. Consideration of implementation requirements, evaluation impacts on life functions, and analysis of consequences were considered most helpful. Somewhat less helpful were the use of structural modeling and the use of program thrusts for specific categories of technologies. The use of scenarios received the greatest number of unpopular responses. Members apparently felt rushed because of having no previous experience with the methodology and because of the tremendous amount of information that was required for the completion of assigned tasks.

All three areas of responses to the instrument are in accord with subjective comments offered in conversation and in writing by work-session members.

Technology Assessment of Human Rehabilitation Techniques

Texas Tech University

TA Work Session Critique Totals

EC Environmental Change
PI Physical Intervention
SD Service Delivery
TC Training and Counseling

1. How satisfied were you with the overall performance of your group(s)?

Responses	EC	PI	SD	TC	All Groups
Very satisfied, accomplished a lot	2	4		1	7
Fairly satisfied	3	4	5	3	15
Slightly more satisfied than dissatisfied			2		2
Slightly more dissatisfied than satisfied			1		1
Fairly dissatisfied					
Very dissatisfied, accomplished nothing					

2. How clear were the groups' goals?

Responses	EC	PI	SD	TC	All Groups
Completely unclear					
Moderately unclear				1	1
Slightly more unclear than clear			1		1
Slightly more clear than unclear	1	1	1	2	5
Moderately clear	3	6	6	1	16
Completely clear	1				1
Undecided					

3. How well did the group work at its task?

Responses	EC	PI	SD	TC	All Groups
Coasted, loafed, made no progress					
Made little progress, most loafed					
Progress was slow, spurts of effective work	1			1	2
Above average in progress and pace of work		1	2		3
Worked well, achieved definite progress	3	4	4	3	14
Worked hard, achieved desired goal		3			3
Undecided	1		2		3

4. To what extent was the group discussion up in the clouds, unrealistic, out of the world, or down to earth, practical, and concrete?

Responses	EC	PI	SD	TC	All Groups
Almost completely in the clouds					
Somewhat off base					
A little more in the clouds than to the point					
More down to earth than in the clouds	2		1	2	5
Mostly down to earth	3	7	6	1	17
Almost completely down to earth		1		1	2
Undecided			1		1

5. To what extent were group members out to win their own points as opposed to considering the merits of issues?

Responses	EC	PI	SD	TC	All Groups
Almost completely considering merits of issues	1	4	2	2	9
Moderately considering merits of issues	2	4	4	1	11
Slightly more considering merits of issues than out to win points				1	1
Slightly more out to win points than to consider merits of issues	1				1
Moderately out to win points			2		2
Almost completely out to win points					
Undecided	1				1

6. To what extent did you have unexpressed feelings and opinions which you did not feel comfortable bringing out in the group(s)?

Responses	EC	PI	SD	TC	All Groups
I felt almost completely under wraps					
Somewhat under wraps					
Slightly more under wraps than free and expressive		1			1
Slightly more free and expressive than under wraps	1		3		4
Somewhat free and expressive		1			1
I felt almost completely free and expressive	4	6	5	4	19

7. To what extent were minority views listened to with respect?

Responses	EC	PI	SD	TC	All Groups
Most were disregarded or ignored					
Many were disregarded					
More were disregarded than given serious thought					
More were given serious thought than disregarded	2	1	4		7
Many were given serious thought		2			2
Most were given serious thought	3	5	4	4	16

8. How strong was the groups' need to depend on the leader/moderator?

Responses	EC	PI	SD	TC	All Groups
Group needed to depend on leader only as much as any other member					
Group had practically no need to depend on leader		3			3
Group had little need to depend on leader					
Group had some need to depend on leader	3	1	4		8
Group had moderately strong need to depend on leader	2	4	3	3	12
Group had strong need to depend on leader			1	1	2

9. How would you characterize the quality of communication in the group(s)?

Responses	EC	PI	SD	TC	All Groups
Very poor, members didn't listen to each other and didn't understand at all					
Poor, members listened and understood very little					
Slightly more poor than good			2		2
Slightly more good than poor					
Good, members listened some and understood some	2	2	3	2	9
Very good, members really listened to each other and understood	3	6	3	2	14

10. How would you characterize the intellectual level of problem solving in the meetings?

Responses	EC	PI	SD	TC	All Groups
Creative, imaginative, logical, critical, generally of extremely high quality	1		1	1	3
Competent, good quality thinking	3	7	7	3	20
Routine, ordinary level of problem-solving		1			1
Less than routine level					
Quite incompetent but some good thinking					
Flat, unimaginative, many illogical ideas, uncritical					
Undecided	1				1

11. How would you characterize the decisions arrived at by the group?

Responses	EC	PI	SD	TC	All Groups
Based largely on views of a vocal minority					
Usually an expression of majority view with little incorporation of minority					
Usually majority view with some modification to reflect minority views	1	3	3	1	8
Usually a well-balanced consensus of all views	3	4	4	3	14
Undecided	1	1	1		3

12. How would you characterize each of the concepts and steps which formed the essential elements of the methodology for this Technology Assessment. Rate each on the following 1-5 scale

A. Analysis of Implementation Requirements	EC	PI	SD	TC	All Groups
1 - Concept or step hindered analysis considerably					
2 - Concept or step hindered analysis more than it helped	1	1			2
3 - Concept or step did nothing to help or hinder analysis		1		1	2
4 - Concept or step helped provide some structure and aided assessment	2	5	7	2	16
5 - Highly valuable, made analysis much easier and aided understanding	1		1	1	3
Undecided	1	1			2

B. Analysis of Impact on Life Functions	EC	PI	SD	TC	All Groups
1 - Concept or step hindered analysis considerably					
2 - Concept or step hindered analysis more than it helped					
3 - Concept or step did nothing to help or hinder analysis	1		2		3
4 - Concept or step helped provide some structure and aided assessment	1	3	6	2	12
5 - Highly valuable, made analysis much easier and aided understanding	2	3		2	7
Undecided	1	2			3

C. Consequence Analysis	EC	PI	SD	TC	All Groups
1 - Concept or step hindered analysis considerably					
2 - Concept or step hindered analysis more than it helped					
3 - Concept or step did nothing to help or hinder analysis	1	1	2	1	5
4 - Concept or step helped provide some structure and aided assessment	4	3	4	1	12
5 - Highly valuable, made analysis much easier and aided understanding		2	2	1	5
Undecided		2		1	3

D. Structural Modeling	EC	PI	SD	TC	All Groups
1 - Concept or step hindered analysis considerably					
2 - Concept or step hindered analysis more than it helped				1	1
3 - Concept or step did nothing to help or hinder analysis		2		2	4
4 - Concept or step helped provide some structure and aided assessment	2	1	3		6
5 - Highly valuable, made analysis much easier and aided understanding	2	1	2	1	6
Undecided	1	4	3		8

E. Use of concept of Program Thrust's within specific technology categories.	EC	PI	SD	TC	All Groups
1 - Concept or step hindered analysis considerably		1			1
2 - Concept or step hindered analysis more than it helped			1		1
3 - Concept or step did nothing to help or hinder analysis	1		2	1	4
4 - Concept or step helped provide some structure and aided assessment	3	6	4	2	14
5 - Highly valuable, made analysis much easier and aided understanding	2				2
Undecided		1	1	1	3

F. Background Material, Working Papers, Topic Papers sent to you

	EC	PI	SD	TC	All Groups
1 - Concept or step hindered analysis considerably					
2 - Concept or step hindered analysis more than it helped					
3 - Concept or step did nothing to help or hinder analysis	1	2	2	1	6
4 - Concept or step helped provide some structure and aided assessment	3	4	4	2	13
5 - Highly valuable, made analysis much easier and aided understanding	1	1	2		4
Undecided		1		1	2

G. Use of Scenario's in considering consequences

	EC	PI	SD	TC	All Groups
1 - Concept or step hindered analysis considerably			1		1
2 - Concept or step hindered analysis more than it helped	1	1	1		3
3 - Concept or step did nothing to help or hinder analysis	2	2	4	2	10
4 - Concept or step helped provide some structure and aided assessment	2	3	1	2	8
5 - Highly valuable, made analysis much easier and aided understanding					
Undecided		2	1		3